



Cisco ASR 901 10G Series Aggregation Services Router Hardware Installation Guide

November, 2014

Cisco Systems, Inc.
www.cisco.com

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco website at www.cisco.com/go/offices.

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

Cisco ASR 901 10G Series Aggregation Services Router Hardware Installation Guide

Copyright © 2012, 2014 Cisco Systems, Inc.



About This Guide	vii
Document Revision History	vii
Objectives	viii
Audience	viii
Organization	viii
Conventions	viii
Safety Warnings	ix
Related Documentation	ix
Obtaining Documentation, Obtaining Support, and Security Guidelines	x

CHAPTER 1

Introduction	1-1
Hardware Description	1-1
Cisco ASR 901 10G Router—Front View of TDM Version	1-2
Cisco ASR 901 10G Router—Front View of Ethernet Version	1-3
Cisco ASR 901 10G Router—Rear View	1-4
LEDs	1-5
Power Supply	1-5
Safety Precautions	1-5
Environmental Monitoring Temperature Sensor	1-7
System Specifications	1-7
Router Interface Numbering	1-7
Cisco ASR 901 10G Router	1-8
Regulatory Compliance	1-9

CHAPTER 2

Preparing to Install the Router	2-1
Safety Guidelines	2-1
Safety with Equipment	2-1
Safety with Electricity	2-2
Preventing Electrostatic Discharge Damage	2-3
Prerequisites	2-4
Site Planning	2-4
Power Supply Considerations	2-4

- Site Environment 2-4
- Air Flow Guidelines 2-5
- Method of Procedure 2-5
- Unpacking and Checking the Contents of your Shipment 2-6
- Required Tools and Equipment 2-6
- Installation Checklist 2-7
- Creating a Site Log 2-8
- Console Port Considerations 2-8
- Console Port Connections 2-8

CHAPTER 3

Installing the Cisco ASR 901 10G Router 3-1

- Network Modules 3-1
- Mounting the Cisco ASR 901 10G Router 3-2
 - Rack-Mounting Configuration Guidelines 3-2
 - Attaching Brackets to the Router 3-3
 - Mounting the Cisco ASR 901 10G Router in a Rack 3-7
 - Wall-Mounting 3-7
 - Attaching Brackets for Wall-Mounting 3-8
 - Mounting the Router on a Wall 3-9
 - Connecting the Chassis Ground and Power 3-10
 - Grounding the Cisco ASR 901 10G Router 3-10
 - Power Connection Compliance 3-12
 - Wiring the DC-Input Power Source 3-12
 - Installing the DC Power Cord Retainer 3-13
 - Installing the AC Power Cord Retainer 3-15
- Installing and Removing SFP Modules 3-17
 - Installing SFP Modules 3-17
 - Removing SFP Modules 3-19
- Connecting Cables 3-20
 - Connecting the Console Port 3-20
 - Types of RJ-45 Cables 3-20
 - Console Port 3-20
 - Connecting the Network Cables 3-21
 - Connecting Gigabit Ethernet Interface Cables 3-21
 - Connecting T1 and E1 Interface Cables 3-21
 - Connecting SFP Cables 3-22
 - Connecting Cables to the BITS Interface 3-22
 - Connecting GPS Cables 3-22
 - Connecting to Alarm Port 3-23

Connecting to the Management Ethernet Port	3-23
Dressing Router Cables	3-23
Powering on the Router	3-24
Checklist for Power on	3-24
Interpreting Front-Panel LEDs	3-24
Power-On Procedure	3-24
Formatting Procedures for Flash Memory	3-25
Formatting Flash Memory as a DOS File System	3-25
File and Directory Procedures	3-25
Copying Files	3-25
Displaying Contents of the Flash Memory	3-26
Deleting Files from the Flash Memory	3-26
Displaying File Content	3-27
Enter a Directory and Determine the Current Directory	3-27
What to Do After Installing the Hardware	3-28

APPENDIX A**Troubleshooting A-1**

Problem Solving	A-1
Troubleshooting the Power and Cooling Systems	A-2
Environmental Reporting Features	A-2
Troubleshooting Cables and Connections	A-3
Reading the LEDs	A-3
Chassis LEDs	A-4
T1/E1 Interface LEDs	A-5
SFP Ethernet Interface LEDs	A-5
10G SFP+ Ethernet Interface LEDs	A-5
RJ-45 Ethernet Interface LEDs	A-5

APPENDIX B**Cable Specifications B-1**

Gigabit Ethernet Connector Pinouts	B-1
SFP and SFP+ Port Pinouts and Cable Specifications	B-2
T1/E1 Port Pinouts	B-2
Console Port Signals and Pinouts	B-3
Console Port Signals and Pinouts	B-4
Identifying a Rollover Cable	B-5
BITS Port Pinouts	B-6
Time of Day Pinouts	B-6
GPS Port Pinouts	B-7

Alarm Port Pinouts **B-8**

Management Ethernet Port Pinouts **B-8**

APPENDIX C

Site Log C-1

INDEX



About This Guide

This section describes the objectives, audience, organization, and conventions of this hardware installation guide.



Note

Use this document with the documents listed in the “[Related Documentation](#)” section on [page 3](#).

This section contains the following topics:

- [Document Revision History, page 1](#)
- [Objectives, page 2](#)
- [Audience, page 2](#)
- [Organization, page 2](#)
- [Conventions, page 2](#)
- [Safety Warnings, page 3](#)
- [Related Documentation, page 3](#)
- [Obtaining Documentation, Obtaining Support, and Security Guidelines, page 4](#)

Document Revision History

The Document Revision History table below records technical changes to this guide. The table shows the document revision number for the change, the date of the change, and a brief summary of the change. Not all Cisco documents use a Document Revision History table.

Revision	Date	Change Summary
OL-28105-01	October 2012	Initial version of the document.
OL-28105-02	March 2014	Added information on new variants of the router.

Objectives

This guide explains how to install, maintain, and troubleshoot your router hardware.

It provides the minimum software configuration information. For the detailed configuration procedures, see the Cisco IOS configuration guide and command reference publications. For more information, see the [“Obtaining Documentation, Obtaining Support, and Security Guidelines” section on page 4](#).

Warranty, service, and support information is in the *Cisco Information Packet* that is shipped with your router.

Audience

This guide is designed for personnel who install, configure, and maintain the router. These persons should be familiar with electronic circuitry and wiring practices and be experienced electronic or electromechanical technicians. This guide identifies certain procedures that should be performed only by trained and qualified personnel.

Organization

Chapter	Title	Description
Chapter 1	Introduction	Describes the hardware features and specifications of the routers.
Chapter 2	Preparing to Install the Router	Describes safety recommendations, site requirements, network connection considerations, required tools and equipment, and provides the installation checklist.
Chapter 3	Installing the Cisco ASR 901 10G Router	Includes router installation information, and shows how to connect the router console port.
Appendix A	Troubleshooting	Describes how to isolate problems, read LEDs, interpret error and status messages, and recover software images.
Appendix B	Cable Specifications	Provides cable specifications to use if you plan to build your own cables.
Appendix C	Site Log	Provides example site log.

Conventions



Note

Means *reader take note*.



Tip

Means *the following information will help you solve a problem*.



Caution

Means *reader be careful*. In this situation, you might perform an action that could result in equipment damage or loss of data.

Safety Warnings

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, might harm you. A warning symbol precedes each warning statement. The safety warnings provide safety guidelines that you should follow when working with any equipment that connects to electrical power or telephone wiring. Warnings are translated into several languages. (For information about compliance guidelines and translated safety warnings, refer to *Cisco Regulatory Compliance and Safety Information for the Cisco ASR 901 Router*.)



Warning

IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

Related Documentation

For additional information, refer to the following documents:

- *Cisco Regulatory Compliance and Safety Information for Cisco ASR 901 Series Aggregation Services Router*
- *Cisco ASR 901 Series Aggregation Services Router Software Configuration Guide*
- *Cisco ASR 901 Series Aggregation Services Router Command Reference*
- *Release Notes for Cisco ASR 901 Series Aggregation Services Router*

To access the related documentation on Cisco.com, go to:

<http://www.cisco.com/c/en/us/support/routers/asr-901-10g-series-aggregation-services-routers/tsd-products-support-series-home.html>

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly *What's New* in Cisco Product Documentation, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>



Introduction

The Cisco ASR 901 10G router is a cell site gateway platform specifically designed to provide transport for both legacy TDM and Ethernet traffic over a single converged network. The Cisco ASR 901 10G router is used at the cell site as a part of a 2G, 3G, or 4G radio access network (RAN) traffic. This router is a small form factor, fixed, low cost platform/solution that seeks to complement the current Cisco portfolio in the IP-RAN segment.

This chapter includes the following sections:

- [Hardware Description, page 1-1](#)
- [Power Supply, page 1-5](#)
- [System Specifications, page 1-9](#)
- [Router Interface Numbering, page 1-9](#)
- [Regulatory Compliance, page 1-11](#)

Hardware Description



Note

This equipment is suitable for installation in Network Telecommunications Facilities and locations where the NEC applies. The equipment is suitable for installation as part of the Common Bonding Network (CBN).

Contained in a standard shelf-rack enclosure, the Cisco ASR 901 10G router weighs approximately 10 pounds (4 kg). It measures 1.7 inches high x 17.5 inches wide x 9.1 inches deep (43.2 x 444.5 x 231 mm), 1RU. These dimensions do not include the rack-mount brackets.

You can mount the router in a standard (ETSI) 19-inch (48.3 cm) equipment rack or 600mm ETSI rack or a 23-inch ETSI rack.

The Cisco ASR 901 10G router includes the following hardware features:

- Eight T1/E1 RJ45 ports.
- Four ports of 100/1000 Copper Ethernet including auto-MDIX (RJ45 connector)
- Four ports of SFP only
- Two ports of 10G SFP+ only
- Four combo ports (SFP/Copper)

- Dual feed supply with redundant DC inputs plus built in redundant power supply (RPS) or single AC input.
- Three fans placed in the chassis
- Chassis: 1 RU, 10 inch depth (Cisco ASR 901 10G router)
- Operating temperature range is -40 to +149°F (-40°C to +65°C).
- Airflow is left to right
- Four solid state alarm inputs
- A single built-in 1Gigabit (128 MB) Flash memory. For A901-6CZ-FS-D and A901-6CZ-FS-A PIDs, the memory requirement is 256MB.
- Two management ports: RS-232 serial console and 10/100 Base-T Ethernet ports
- One BITS clock port (RJ45) and 1 ToD port (RJ45)
- Two miniature coaxial connectors for 10Mhz and 1PPS timing (input or output). You can use these interfaces with an external GPS device to send or receive clocking from the router.
- A single USB port
- Two LEDs for each T1/E1 port
 - C—indicates out of service or not configured, carrier condition, and loop condition
 - AL—no alarm, or alarm condition
- Two LEDs for each Ethernet port
 - L—indicates activity, lack of activity, or no link
 - S—indicates speed (100 or 1000) or off
- One System LED:
 - Solid Green—System Healthy (normal operation)
 - Solid RED—System Faulty

Cisco ASR 901 10G Router—Front View of TDM Version

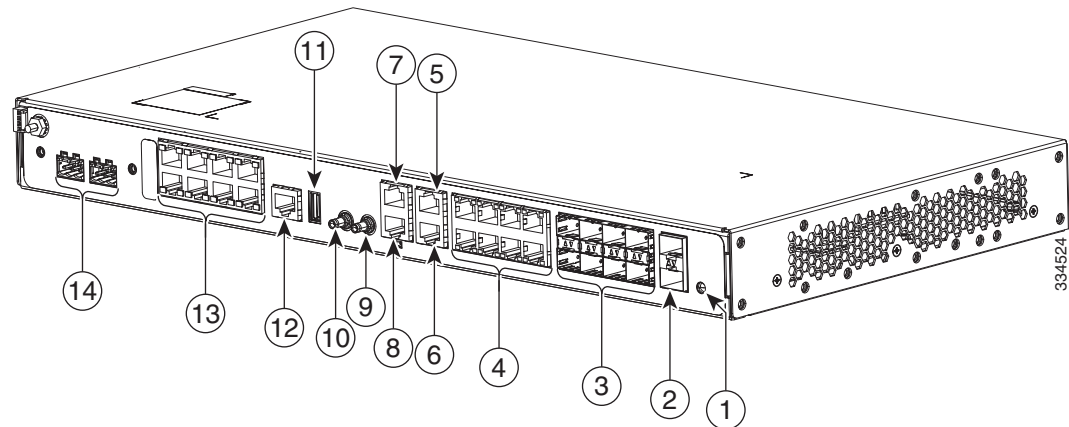
The front panel of the Cisco ASR 901 10G (TDM version) router has the following components:

- Eight T1/E1 ports, labelled T1/E1 (positions 0, 1, 2, 3, 4, 5, 6, and 7)
- Eight RJ-45 connectors for copper Ethernet ports, labeled “GE” (positions 0, 1, 2, 3, 4, 5, 6, and 7)
- Eight SFP connectors for optical GE ports (positions 4, 5, 6, 7, 8, 9, 10, and 11)
- Two SFP+ connectors for optical 10 G ports (positions 0 and 1)
- Two miniature coaxial connectors for 10MHZ and 1PPS timing
- A single RJ-45 connector for console, labeled “CONSOLE”
- A single RJ-45 connector for management port, labeled “MGMNT”
- A single RJ-45 connector for the BITS interface, labeled “BITS”
- A single RJ-45 connector for the ToD interface, labeled “TOD”
- A single RJ-45 connector for alarm.
- Dual feed supply with redundant DC inputs or single AC input.
- The following LEDs

- T1/E1 ports
- Ethernet ports
- SFP ports
- Chassis: Single LED for multiple conditions

Figure 1-1 shows the front view of the Cisco ASR 901 10G router (TDM version) with each interface module.

Figure 1-1 Cisco ASR 901 10G Router—Front View of TDM Version



1	Power LED	8	BITS port
2	10G SFP+	9	MINI-coax connector (10MHZ)
3	8 SFP ports	10	MINI-coax connector (1PPS)
4	8 GE port	11	USB port
5	Management port	12	Alarm
6	Console port	13	8 T1/E1 ports
7	ToD port	14	Power connector (DC or AC)

Cisco ASR 901 10G Router—Front View of Ethernet Version

The front panel of the Cisco ASR 901 10G (Ethernet version) router has the following components:

- Two SFP+ connectors for optical 10G ports (positions 0 and 1)
- Eight SFP connectors for optical GE ports (positions 4, 5, 6, 7, 8, 9, 10, and 11)
- Eight RJ-45 connectors for copper Ethernet ports, labeled “GE” (positions 0, 1, 2, 3, 4, 5, 6, and 7)
- A single RJ-45 connector for management port, labeled “MGMT”
- A single RJ-45 connector for console, labeled “CONSOLE”
- A single RJ-45 jack for the BITS interface, labeled “BITS”
- A single RJ-45 jack for the ToD interface, labeled “ToD”

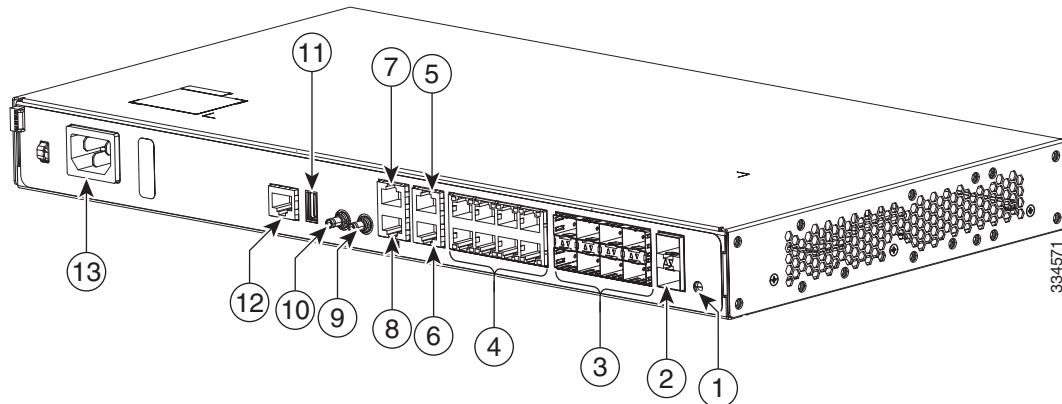
- Two miniature coaxial connectors for 10MHZ and 1PPS timing
- A single alarm port
- A single USB port (for AC version)
- Dual feed supply with redundant DC inputs or single AC input.

The following LEDs

- Ethernet ports
- SFP ports
- Chassis: Single LED for multiple conditions

Figure 1-2 shows the front view of the Cisco ASR 901 10G router (Ethernet version) with each interface module.

Figure 1-2 Cisco ASR 901 Router—Front View of Ethernet Version



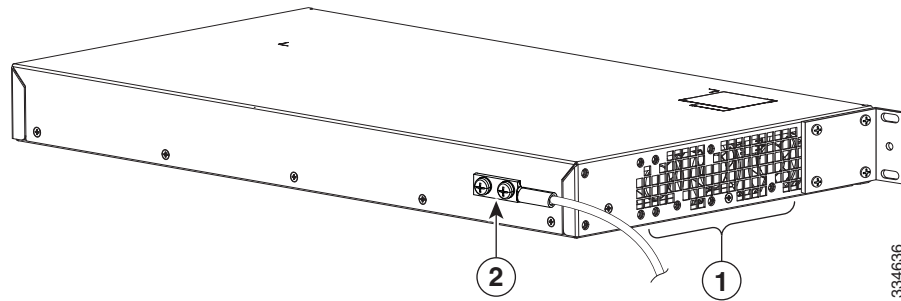
1	Power LED	8	BITS port
2	10G SFP+ ports	9	MINI-coax connector (10MHZ)
3	8 SFP ports	10	MINI-coax connector (1PPS)
4	8 GE ports	11	USB port
5	Management port	12	Alarm
6	Console port	13	Power connector (AC or DC)
7	ToD port	14	—

Cisco ASR 901 10G Router—Rear View

Figure 1-3 shows the rear view of the Cisco ASR 901 10G router, including the orientation of the following components:

- Three blowing fans
- Mounting point for the 2-hole lug. For more information, see the [Connecting the Chassis Ground and Power, page 3-10](#)

Figure 1-3 Cisco ASR 901 10G Router—Rear View



1	Fan	2	Grounding Point Lug
---	-----	---	---------------------

**Note**

The grounding architecture of this product is DC-isolated (DC-I) for DC-powered products. DC-powered products have a nominal operating DC voltage of 48 VDC. Minimal steady state DC operating voltage is 19.2 VDC.

LEDs

The Cisco ASR 901 10G chassis and interface modules contain LEDs to assist in troubleshooting. For more detailed description of the LEDs, see the “[Reading the LEDs, page A-4](#).”

Power Supply

The Cisco ASR 901 10G router is equipped with an internal -24/-60 Volts Direct Current (VDC). The router is provided with a single AC power supply or DC (1+1 Redundant) power supply. The power input connectors are located at the front left-side side of the router. The DC power connector has the standard A and B feeds for DC redundancy. The DC power supply is compatible with the range of DC input voltages specifically available at cell sites.

See [Table 1-1](#) for the DC power supply specifications and [Table 1-2](#) for the AC power supply specifications.

Safety Precautions

Observe the following general safety precautions and recommendations in planning the source power requirements for the Cisco ASR 901 10G router (for additional safety information, see the “[Safety Guidelines](#)” section on [page 2-1](#)):

- Check the power at your site before router installation (and periodically after installation) to ensure clean power (free of spikes and noise) is being received.
- Always disconnect the power source and unplug the power cable before working on the router.

- Install proper grounding for the site to avoid damage from lightning and power surges.



Warning

To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. Statement 1021



Warning

There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015



Warning

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028



Warning

The intrabuilding ports of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use only as intrabuilding interfaces (Type 2 or Type 4 ports as described in GR-1089-CORE), and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.



Warning

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the (Management Ethernet) ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

Table 1-1 lists the DC power supply specifications for the Cisco ASR 901 10G router.

Table 1-1 Cisco ASR 901 10G Router DC Power Supply Specifications

Specification	Value
DC power supply input voltage	-24/-60 VDC
Maximum input current	4A
Wire gauge for DC input power connections	16 AWG
Power dissipation	<ul style="list-style-type: none"> • A901-6CZ-F-D: 58W • A901-6CZ-FS-D: 59W • A901-6CZ-FT-D: 67W

Table 1-2 lists the AC power supply specifications for the Cisco ASR 901 10G router.

**Warning**

This product requires surge protection as part of the building installation. To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, an external surge protective device (SPD) is required at the AC power service equipment.

Table 1-2 Cisco ASR 901 10G Router AC Power Supply Specifications

Specification	Value
Power supply	115 to 230 V
Power dissipation	<ul style="list-style-type: none"> • A901-6CZ-F-A: 57W • A901-6CZ-FS-A: 58W • A901-6CZ-FT-A: 65W
Input voltage rating	100V-240V, 1A-0.5A, 50-60Hz
Operating voltage rating	85~264 VAC at 47/63Hz
AC current rating	1A at 100 VAC and 60 Hz.

The Cisco ASR 901 10G router uses two 3-pin connectors (part number 27-1892-01) for DC input to the power supply. The terminal block is part of the accessory kit (part number 53-3438-01), which ships with the Cisco ASR 901 10G router.

The Cisco ASR 901 10G router uses a single 3-pin connector (29-1609-01) for AC input to the power supply.

The ground wire connects to a 2-hole lug, which connects to the corresponding mounting point. With the connector installed in the chassis, the pins numbered from left to right are 1, 3, and 2, respectively.

Figure 1-4 shows the pinout configurations for the connector, based on the power source.

**Note**

You can use connector A or B or both.

Figure 1-4 Power Supply Connector Pinouts

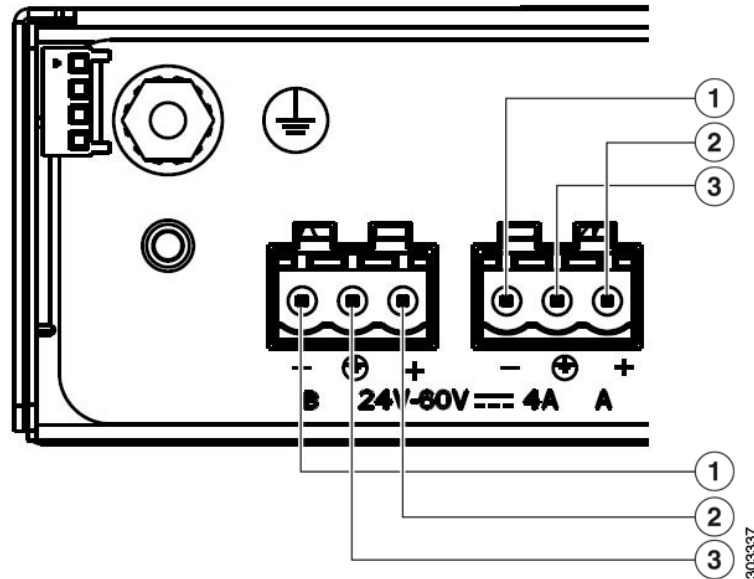


Table 1-3 Power Supply Connector Pinouts (-24/-60 VDC Application)

Pin	Connector A	Connector B
1	VDC (-24 to -60)	VDC (-24 to -60)
2	RTN	RTN
3	Chassis Ground	Chassis Ground

Environmental Monitoring Temperature Sensor

The Cisco ASR 901 10G router has a temperature sensor to detect overtemperature conditions inside the chassis. The overtemperature detection trips at 70°C. This condition is reported to the processor as an interrupt, where the software generates the appropriate alarms. If the router reaches a temperature of 90°C, the power supply cycles itself to prevent the router from exceeding the maximum temperature while being powered up.



Note

Auxiliary port is not supported.

System Specifications

Table 1-4 lists the system specifications for the Cisco ASR 901 10G router.

Table 1-4 Cisco ASR 901 10G Router System Specifications

Description	Specification
Dimensions (H x W x D)	1.7 x 17.5 x 9.1 in. (43.2 x 444.5 x 231 mm) 1 RU (rack unit) in a 19-inch (48.3 cm) rack
Weight	<ul style="list-style-type: none"> • A901-6CZ-FT-D: 8.15 lb (3.7 kg) • A901-6CZ-F-D: 7.93 lb (3.6 kg) • A901-6CZ-FS-D: 7.93 lb (3.6 kg) • A901-6CZ-FT-A: 8.15 lb (3.7 kg) • A901-6CZ-F-A: 7.93 lb (3.6 kg) • A901-6CZ-FS-A: 7.93 lb (3.6 kg)
Console port	RJ-45 connector
Operating Temperature	Operating temperature range is -40°C to +65°C (-40 to +149°F)
Non-Operational Temperature	Temperature: -40°C to +70°C (-40 to +158°F)
Operating Humidity	5% to 85%, noncondensing RH, ±5%
Non-Operational Humidity	Upto 93% RH
Operating Altitude	13,000 ft. (4000 m) with maximum 104°F (40°C) ambient temperature
Operating Vibration	0.15 G, 10 to 500 Hz/100 minutes per axis
Non-Operational Vibration	0.8 G, 10 to 500 Hz/30 minutes per axis
Operating Acoustics	61 dBA with 19 cfm fan
Air Flow	Left to right, 57 cfm

Router Interface Numbering

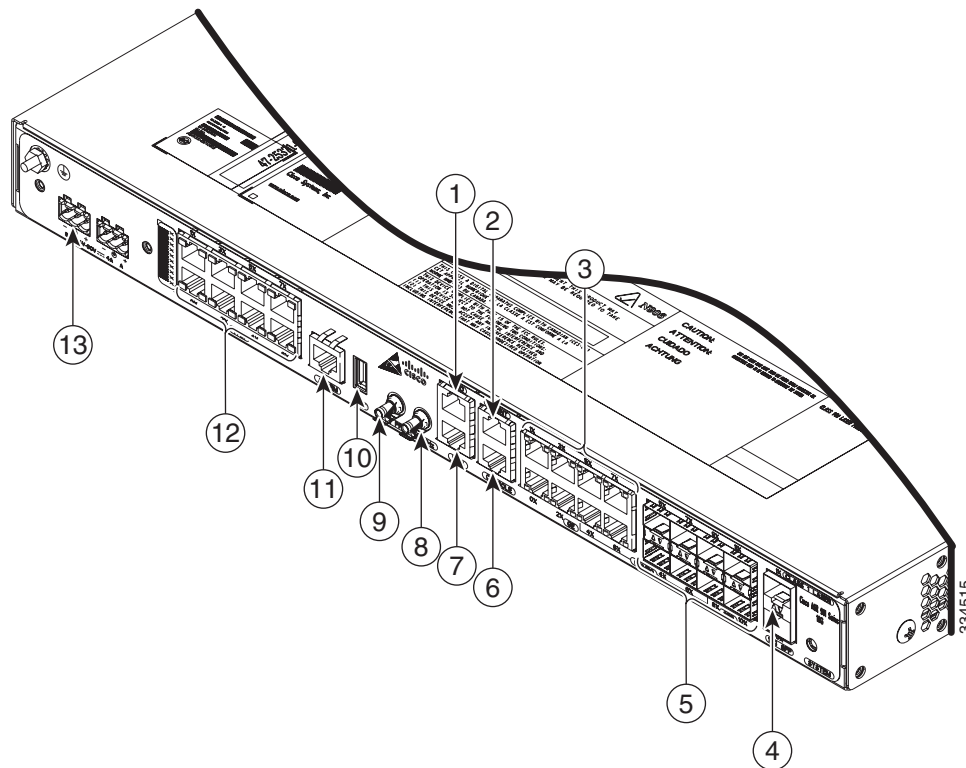
The following section explains router interface numbering and interface labels for the Cisco ASR 901 10G router.

Cisco ASR 901 10G Router

Each network interface on a Cisco ASR 901 10G 10G router is identified by a slot number and a port number, explained in this sequence:

- Logical slot numbers starts from 0 for all built-in interfaces. The numbering format is **Interface type Slot number/Interface number**. Interface (port) numbers begin at logical 0 for each interface type.
- Logical interface numbering for 10G SFP+ ports runs from 0/0 through 0/1. Ports are numbered bottom to top.
- Logical interface numbering for T1/E1 ports on the TDM interface module runs from 0/0 through 0/7. Ports are numbered bottom to top, left to right.
- Logical interface numbering for the built-in ethernet ports runs from g0/0 through g0/3, the combo ports run from g0/4 to g0/7 and the SFP ports run from g0/8 through g0/11. The GE ports are numbered bottom to top, left to right.

Figure 1-5 Cisco ASR 901 10G Router Port Numbers



1	ToD port	7	BITS port
2	Management port	8	MINI-Coax Connector (1PPS)
3	8 GE ports	9	MINI-Coax Connector (10MHZ)

4	SFP+ port	10	USB port
5	8 SFP ports	11	Alarm cable
6	Console port	12	8 T1/E1 ports

Table 1-5 Cisco ASR 901 10G Router Interface Labels

Interface	Number	Location	Label
SFP connector for optical 10 GE ports	2	Onboard	10G SFP
SFP connector for optical GE ports	8	Onboard	SFP
RJ45 jacks for copper ethernet ports	8	Onboard	GE
RJ45 connector for console	1	Onboard	CONSOLE
RJ45 connector for management port	1	Onboard	MGMNT
RJ45 jack for BITS interface	1	Onboard	BITS
RJ45 jack for Time-of-Day interface	1	Onboard	TOD
1PPS mini-coax timing connector	1	Onboard	1PPS
10Mhz mini-coax timing connector	1	Onboard	10MHZ
RJ48 jacks for T1/E1 ports	8	T1/E1 interface module	T1/E1
RJ48 jacks for Alarm Cable	1	Onboard	Alarm
Power connector	1	Onboard	Power Connector

Regulatory Compliance

For regulatory compliance and safety information, see [Cisco Regulatory Compliance and Safety Information for Cisco ASR 901 Series Aggregation Services Router](#).



Preparing to Install the Router

This chapter describes site requirements and equipment used to install the Cisco ASR 901 10G router. It includes the following sections:

- [Safety Guidelines, page 2-1](#)
- [Prerequisites, page 2-4](#)
- [Site Planning, page 2-4](#)
- [Console Port Considerations, page 2-8](#)

Safety Guidelines

Before you begin installing the Cisco ASR 901 10G router, review the safety guidelines in [Safety Precautions, page 1-5](#), and the [Rack-Mounting Configuration Guidelines, page 3-2](#) to avoid injuries to yourself, or damage to the equipment.

Additionally, before replacing, configuring, or maintaining the Cisco ASR 901 10G router, review the safety warnings listed in the document [Cisco Regulatory Compliance and Safety Information for Cisco ASR 901 Series Aggregation Services Router](#).

Safety with Equipment

The following guidelines help ensure your safety and equipment's protection. This list does not include all the potentially hazardous situations, so be *alert*.



Warning

Before connecting the system to the power source, read the installation instructions. Statement 1004

- Before moving the system, always disconnect all the power cords and interface cables.
- Never assume that power is disconnected from a circuit; *always* check.
- Before and after installation, keep the chassis area clean and dust-free.
- Keep tools and assembly components away from walk areas to avoid tripping over them.
- Do not work alone in potentially hazardous conditions.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Do not wear loose clothing that may get caught in the chassis.

- When working under conditions hazardous to your eyes, wear safety glasses.

Safety with Electricity



Warning

Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003



Warning

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017



Warning

To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Statement 1021



Warning

Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43



Warning

Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. Statement 12



Warning

During periods of lightning activity, do not work on the system or connect or disconnect cables. Statement 1001



Warning

There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015



Warning

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

When working on electrical equipment, follow these guidelines:

- Locate the room's emergency power switch. If an electrical accident occurs, you can quickly switch off the power.
- Before working on the system, switch off the DC main circuit breaker and disconnect the power terminal block cable.
- Disconnect all power before performing the following:

- Working on or near power supplies.
- Installing or removing a router chassis, or network processor module.
- Performing most hardware upgrades.
- Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards, such as wet floors, ungrounded power extension cables, and missing safety grounds.
- Never assume that power is disconnected from a circuit; *always* check.
- Never perform any action that creates a potential hazard to people or makes the equipment unsafe.
- If an electrical accident occurs, proceed as follows:
 - Use caution, and do not become a victim yourself.
 - Switch off power to the router.
 - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim, and then call for help.
 - Determine whether the person needs rescue breathing or external cardiac compressions; then take appropriate action.

In addition, use the following guidelines when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for it.
- Never touch un-insulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- When installing or modifying telephone lines, use caution.

Preventing Electrostatic Discharge Damage

Electrostatic Discharge (ESD) can damage equipment and impair electrical circuitry. ESD can occur when electronic printed circuit cards are improperly handled, and can cause complete or intermittent failures. When removing and replacing modules, always follow ESD prevention procedures:

- Ensure that the router chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. To channel unwanted ESD voltages safely to ground, connect the clip to an unpainted surface of the chassis frame. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.
- If no wrist strap is available, ground yourself by touching a metal part of the chassis.



Caution

For the safety of your equipment, periodically check the resistance value of the antistatic wrist strap. It should be between 1 and 10 Mohm.

Prerequisites

Before installing the Cisco ASR 901 10G router, it is important to prepare for installation by:

- Preparing the site (site planning) and reviewing the installation plans or method of procedures (MOPs).
- Unpacking and inspecting the Cisco ASR 901 10G router.
- Gathering tools and test equipment required to properly install the Cisco ASR 901 10G router.

Site Planning

Ideally, you should have prepared the installation site beforehand. As part of your preparation, obtain a floor plan of the site and the equipment rack where the Cisco ASR 901 10G router would be housed. Determine the location of any existing routers and their interconnections, including communications and power. Following the air flow guidelines (see the [“Air Flow Guidelines” section on page 2-5](#)), ensure that adequate cooling air is provided to the router.

All personnel involved in the installation of the router including installers, engineers, and supervisors should participate in the preparation of a Method of Procedure (MOP) for approval by the customer.

Power Supply Considerations

Check the power at your site to ensure that you are receiving clean power (free of spikes and noise). Install a power conditioner if necessary (see the [Power Supply, page 1-5](#) for power requirements).



Warning

This equipment is designed for connection to TN and IT power systems. Statement 16

Site Environment

Install the Cisco ASR 901 10G router in an equipment rack. The location of your router and the layout of your equipment rack, or wiring room are extremely important considerations for proper operation. Cramped equipment, inadequate ventilation, and inaccessible panels can cause malfunctions and shutdown, and can make maintenance difficult. Plan to access the front and rear panels of the router.

Take the following precautions for an acceptable operating environment for your router and to avoid environmentally caused equipment failures:

- Ensure that the room where your router operates has adequate air circulation. Electrical equipment generates heat. Without adequate circulation, ambient air temperature may not cool the equipment to acceptable operating temperatures.
- Always follow ESD-prevention procedures described in the [“Preventing Electrostatic Discharge Damage” section on page 2-3](#) to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- The router should be placed inside a space protected from direct outside weather and environmental stress by an enclosure, where the operating climate (as defined by Class 2 of GR-3108-CORE) is between:
 - -40 to +149°F (-40°C to +65°C)

- 5% to 85% RH

**Note**

For an outside plant installation (cell site cabinet, hut, etc.), it is required that the router be protected against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air or other reactive elements present in the outside air. To achieve this level of protection, it is recommended that the unit is installed in a fully sealed (i.e. Closed Loop) enclosure. Examples of such cabinets include IP65 cabinets with heat exchanger, complying with Telecordia GR487.

Air Flow Guidelines

To ensure adequate air flow through the equipment rack, we recommend that you maintain a clearance of at least 6 inches (15.24 cm) on each side of the rack at all times.

**Caution**

If air flow through the equipment rack and the routers that occupy it is blocked or restricted, or if the ambient air being drawn into the rack is too warm, an over temperature condition can occur within the rack and the routers that occupy it.

The site should also be as dust-free as possible. Dust tends to clog the router fans, reducing the flow of cooling air through the equipment rack and the routers. Thus, increasing the risk of an over temperature condition.

Use the following guidelines to plan your equipment rack configuration:

- Mount the Cisco ASR 901 10G router in a 19-inch rack (with a 17.5- or 17.75-inch opening).
- Beside air flow, you must allow clearance around the rack for maintenance.
- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each router generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat that is generated by equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.
- When mounting a chassis in an open rack, ensure that the rack frame does not block the intakes or (on the left side of the chassis) or the exhaust (on the right side of the chassis).
- When a rack-installed equipment fails, especially equipment in an enclosed rack, try making the equipment operate by itself, if possible. Power off other equipment in the rack (and in adjacent racks) to give the router a maximum of cooling air and clean power.

Method of Procedure

Part of site preparation includes reviewing installation plans or method of procedures (MOPs). An example of a MOP that includes pre-installation checklist of tasks, considerations to address and agree upon before proceeding with the installation, is as follows:

1. Read this hardware installation guide.
2. Assign personnel.
3. Determine protection requirements for personnel, equipment, and tools.
4. Evaluate potential hazards that may affect service.
5. Schedule time for installation.

6. Determine space requirements.
7. Determine power requirements.
8. Identify required procedures or tests.
9. Make a preliminary plan that locates each Cisco ASR 901 10G router that you plan to install.
10. Verify the list of replaceable parts for installation (screws, bolts, washers, and so on).
11. Check the required tools list to make sure the necessary tools and test equipment are available (see the [“Required Tools and Equipment”](#) section on page 2-6).
12. Perform the installation.

Unpacking and Checking the Contents of your Shipment

The shipping package for the Cisco ASR 901 10G router is designed to reduce the possibility of product damage associated with routine handling experienced during shipment. Do not remove the router from its shipping container until you are ready to install it.



Note

Do not discard the packaging materials used in shipping your Cisco ASR 901 10G router. You will need the packaging materials in the future if you move or ship the router.

The Cisco ASR 901 10G router, cables, and any optional equipment you ordered may be shipped in more than one container. When you unpack the containers, check the packing list to ensure that you receive all of the following items:

- Router
- Accessory kit (for DC routers) containing:
 - Terminal block (part number 27-1892-01)
 - Two hole lug, 6-AWG ground wire, number10 blue stud (part number 32-0619-01)
 - Two pan-head Phillips screws used to attach the lug to the router, 10-32x.365inch
 - Two cable clamp (part number 52-0685-01)
 - Two pan-head Phillips screws used to attach the cable clamps to the router (part number 48-1163-01), size number 6-32
- Accessory kit (for AC routers) containing:
 - One two-hole lug, 6-AWG ground wire number 10 blue stud (part number 32-0619-01)
 - Two pan-head Phillips screws used to attach the lug to the router, 10-32x.365inch
 - One cable tie for AC power cord (part number 700-33927-01)
- *Cisco Information Packet* publication

Inspect all items for shipping damage. If an item appears to be damaged, or if you encounter problems installing or configuring your router, contact customer service. The *Cisco Information Packet* provides warranty, service, and support information.

Required Tools and Equipment

You need the following tools and equipment to install and upgrade the router and its components:

**Warning**

Only trained and qualified personnel should be allowed to install or replace this equipment.

Statement 49

- ESD-preventive cord and wrist strap.
- Number 2 Phillips screwdriver.
- Flat-blade screwdrivers: small, 3/16-inch (0.476 cm) and medium, 1/4-inch (0.625 cm).
 - To install or remove modules
 - To remove the cover, if you are upgrading memory or other components
- Number 12-24 pan-head screws to secure the router to the equipment rack.
- Cables for WAN and LAN port connections (depending on the configuration).



Note For more information on cable specifications, see [Appendix B, “Cable Specifications”](#)

- Ethernet hub or PC with a network interface card for connection to the Ethernet (LAN) ports.
- Console terminal (an ASCII terminal or a PC running terminal emulation software), which is configured for 9600 baud, 8 data bits, no parity, and 2 stop bits.
- Console cable for connection to the console port.
- Ratcheting torque screwdriver with a Phillips head that exerts up to 15 pound-force inches (lbf-in) of pressure.
- Crimping tool as specified by the ground lug manufacturer.
- 16-AWG copper wire for the power cord.
- Wire-stripping tools for stripping both the 6-AWG and 18-AWG wires.
- Serial interfaces may require a channel service unit or a data service unit (CSU/DSU).

Installation Checklist

To assist you with your installation and to provide a historical record of completed tasks and users, use the following installation checklist. Make a copy of this checklist and mark the entries as you complete each task. When the checklist is completed, include a copy of the checklist for each router in your site log along with other records for your new router. See [Appendix C, “Site Log”](#) for information on the site log, including a sample site log.

Installation Checklist for Site:

Router Name:

Task	Verified by	Date
Installation checklist copied		
Background information placed in site log		
Site power voltages verified		
Installation site power check completed		
Required tools available		

Task	Verified by	Date
Additional equipment available		
Router received		
Documentation DVD received (if ordered)		
<i>Cisco Information Packet</i> publication received		
Chassis components verified		
Initial electrical connections established		
ASCII terminal (for local configuration) or modem (for remote configuration)		
Signal distance limits verified		
Start-up sequence steps completed		
Initial operation verified		
Software image verified		

Creating a Site Log

The site log provides a record of all actions related to installing and maintaining the router. Keep it in an accessible place near the chassis so that anyone who performs tasks has access to it.

Create the site log prior to installation. (See [Appendix C, “Site Log”](#) for more detailed information on the site log as well as a sample site log that can be used to make copies.)

Console Port Considerations

The Cisco ASR 901 10G router provides a single console port (labeled CONSOLE). A single RJ-45 cable is used for a console connection.

This section describes important cabling information to consider before connecting a console terminal—either an ASCII terminal or a PC running terminal emulation software—or a modem to the console port. The console port provides access to the router either locally (using a console terminal), or remotely (using a modem).



Note

Console and rollover cables are not included with the Cisco ASR 901 10G router. You can order the console cable from Cisco Systems, Inc. (Part number ACS-1900ASYN=).

Console Port Connections

The router provides an EIA/TIA-232 asynchronous serial console port (RJ-45). Depending on the cable and the adapter used, this port appears as a data terminal equipment (DTE) or data communications equipment (DCE) device at the end of the cable.

To connect an ASCII terminal to the console port, use the RJ-45 rollover cable with the female RJ-45-to-DB-25 adapter (labeled TERMINAL). To connect a PC running terminal emulation software to the console port, use the RJ-45 rollover cable with the female RJ-45-to-DB-9 adapter (labeled TERMINAL). The default parameters for the port are 9600 baud, 8 data bits, no parity, and 2 stop bits.

As a console port, hardware flow control is not supported. For instructions on installing a console terminal, see the [“Connecting the Console Port”](#) section on page 3-20.

For cable and port pinouts, see the online document *Cisco Modular Access Router Cable Specifications*. This document is provided on the documentation DVD that accompanied your router (if ordered).



Installing the Cisco ASR 901 10G Router

This chapter describes how to install the Cisco ASR 901 10G router, and how to connect it to external devices. These are the following sections:

- [Network Modules, page 3-1](#)
- [Mounting the Cisco ASR 901 10G Router, page 3-2](#)
- [Connecting the Chassis Ground and Power, page 3-10](#)
- [Installing and Removing SFP Modules, page 3-17](#)
- [Connecting Cables, page 3-20](#)
- [Powering on the Router, page 3-24](#)



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.
Statement 1030



Warning

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.
Statement 1017

Network Modules

You can order the Cisco ASR 901 10G router with the following interface modules.

- T1/E1 interface module
- SFP Ethernet interface module
- RJ-45 Ethernet interface module



Note

Interface modules are installed and shipped with the router; they are not field replaceable.

Mounting the Cisco ASR 901 10G Router



Note

The Cisco ASR 901 10G router is qualified only for horizontal orientation. You should use additional safety measures for vertical orientation.

Each Cisco ASR 901 10G router includes rack-mounting brackets. Using the rack-mounting brackets, you can mount the Cisco ASR 901 10G router in a 19-inch, 23-inch, or an ETSI rack that conforms to the EIA-310-D specification.

Using the two rack-mounting brackets for mounting, you can recess Cisco ASR 901 10G router in the equipment rack. This arrangement provides extra space in front of the router for the cables and allows you to close the doors of racks equipped with front-close doors.

To attach or replace the rack-mounting brackets, see the [“Attaching Brackets to the Router”](#) section on page 3-3.

The rack-mounting brackets are slotted to allow the router to be mounted in racks with EIA 1.25-inch (3.175-cm) or WECCO 1.0-inch (2.54-cm) hole spacing. When installed in the rack, the Cisco ASR 901 10G router requires one EIA 1.75-inch (4.4-cm) vertical mounting space (or 1 rack unit [RU]) for mounting (see the [“Mounting the Cisco ASR 901 10G Router in a Rack”](#) section on page 3-7).



Caution

Allow clearance on either side of the router for cooling air to be drawn in through the right side and circulated through the chassis and out the three-fan exhaust ports mounted on the other side of chassis.

Rack-Mounting Configuration Guidelines

Follow these guidelines to configure the equipment rack:

- When mounting the router to an equipment rack, ensure that the rack is bolted to the floor.
- Because you may install more than one router into the rack, ensure that the weight of all of the routers installed does not make the rack unstable.



Caution

Some equipment racks are also secured to ceiling brackets, if necessary, due to the weight of the equipment in the rack. Make sure that the rack you use to install the routers is secured to the building structure.

- As mentioned in the [“Air Flow Guidelines”](#) section on page 2-5, maintain a 6-inch (15.24-cm) clearance on each side of the router to ensure adequate air intake and exhaust.
- Avoid installing the routers in an overly congested rack. Air flowing to or from other routers in the rack might interfere with the normal flow of cooling air through the routers, increasing the potential for overtemperature conditions within the routers.
- Allow at least 19 inches (48.7 cm) of clearance at the front and rear of the rack for router maintenance.
- Follow your local practices for cable management. Ensure that cables to and from the routers do not impede access to perform equipment maintenance or upgrades.

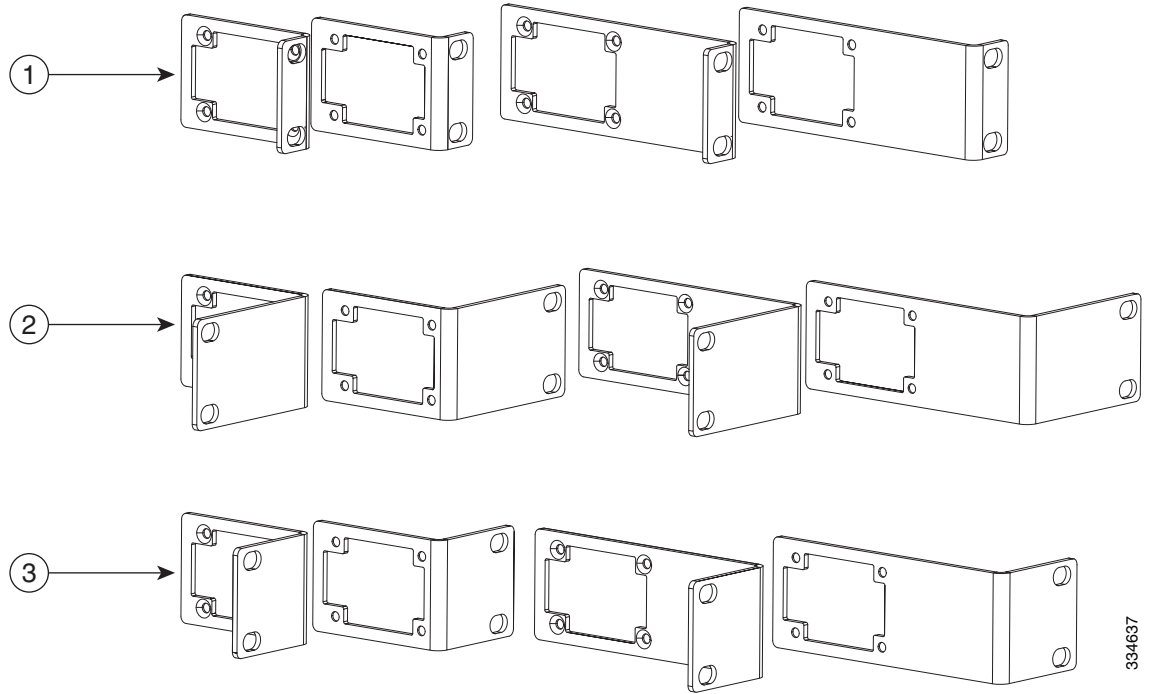
To install the switch in a 19-inch, 23-inch, or a European Telecommunications Standards Institute (ETSI) rack, follow these instructions (The ETSI racks require optional mounting hardware):

- [Attaching Brackets to the Router, page 3-3](#)
- [Mounting the Cisco ASR 901 10G Router in a Rack, page 3-7](#)

Attaching Brackets to the Router

The bracket orientation and the brackets that you use depend on whether you are attaching the brackets for a 19-inch, 23-inch, or an ETSI rack. [Figure 3-1](#) shows the types of mounting brackets.

Figure 3-1 Rack-Mounting Brackets



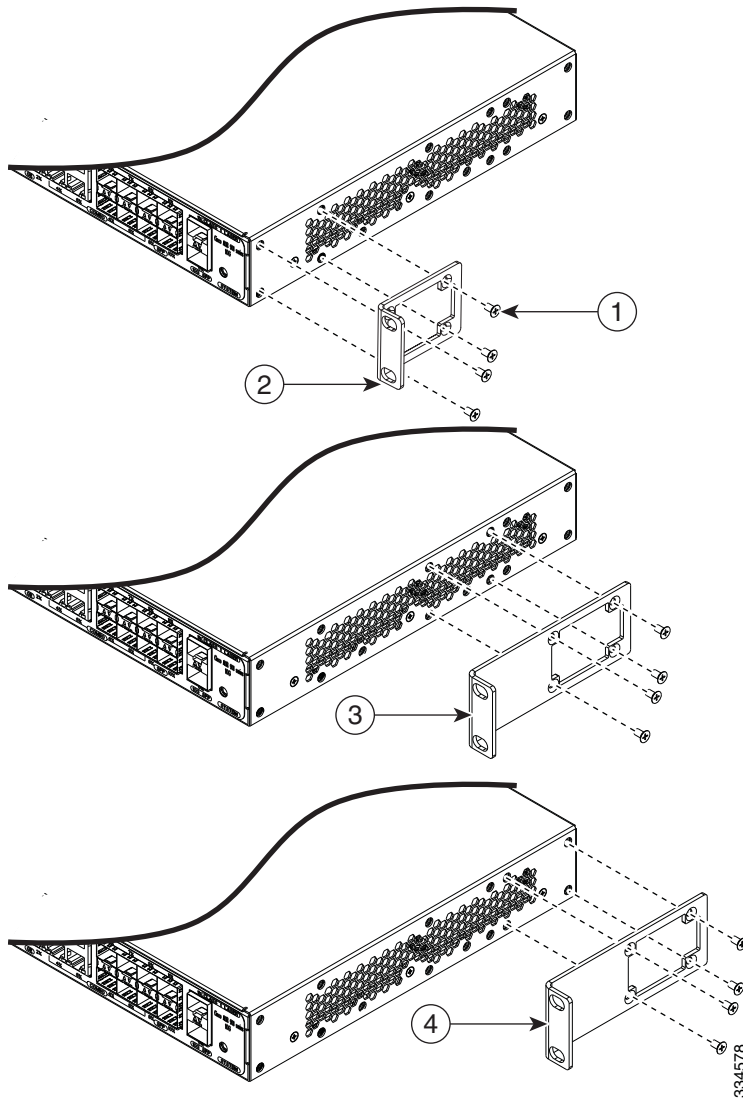
1	19-inch brackets	2	23-inch brackets
3	ETSI-rack brackets	4	—

- For 19-inch racks, use part number 700-39959-01 (see [“Attaching Brackets for 19-Inch Racks” section on page 3-4](#)).
- For 23-inch racks, use part number 700-40065-01 (see [“Attaching Brackets for 23-Inch Racks” section on page 3-5](#)).
- For ETSI racks, use part number 700-40067-01 (see [“Attaching Brackets for ETSI Racks” section on page 3-6](#)).

Attaching Brackets for 19-Inch Racks

Figure 3-2 shows how to attach brackets for 19-inch racks on the router.

Figure 3-2 Attaching Brackets for 19-Inch Racks

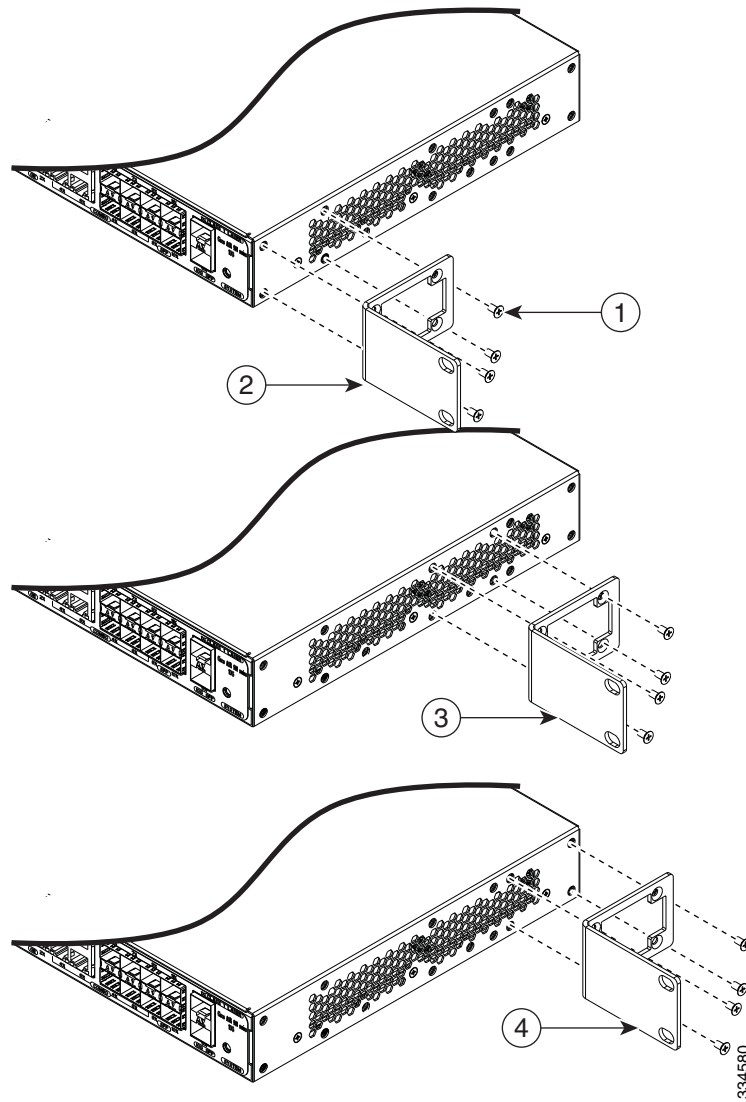


1	Phillips flat-head screws	2	Front-mounting position
3	Mid-mounting position	4	Rear-mounting position

Attaching Brackets for 23-Inch Racks

Figure 3-3 shows how to attach brackets for 23-inch racks on the router.

Figure 3-3 Attaching Brackets for 23-Inch Racks

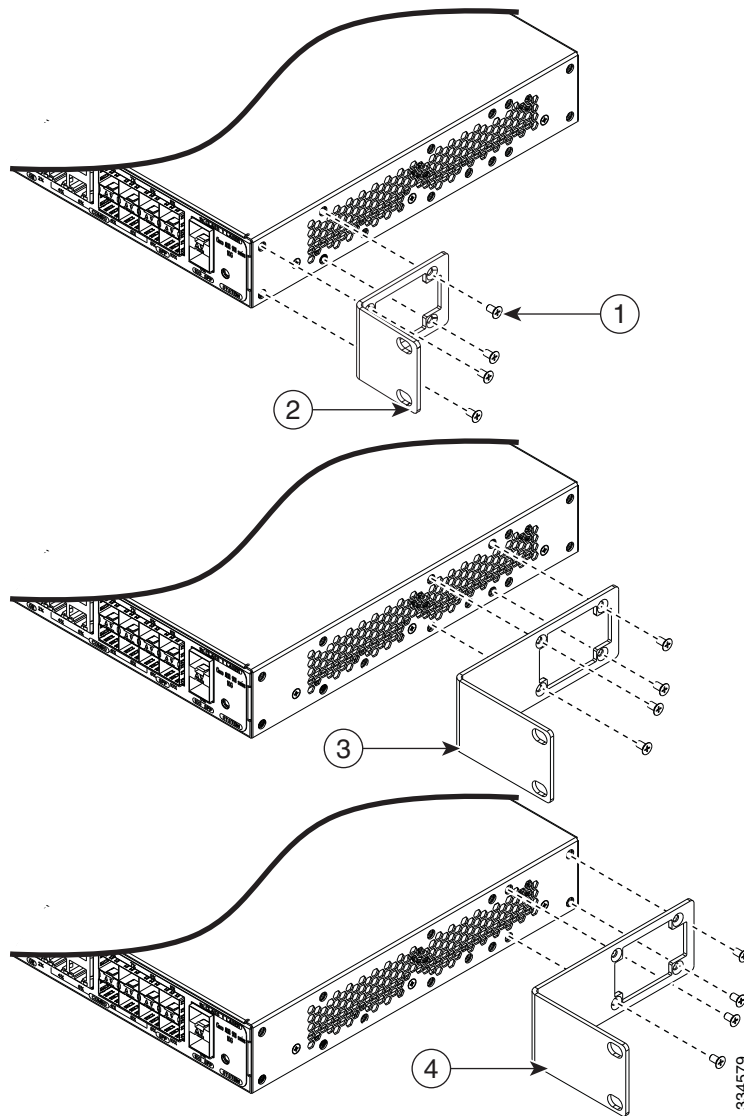


1	Phillips flat-head screws	2	Front-mounting position
3	Mid-mounting position	4	Rear-mounting position

Attaching Brackets for ETSI Racks

Figure 3-4 shows how to attach brackets for ETSI racks on the router.

Figure 3-4 Attaching Brackets for ETSI Racks



1	Phillips flat-head screws	2	Front-mounting position
3	Mid-mounting position	4	Rear-mounting position

Mounting the Cisco ASR 901 10G Router in a Rack

Perform the steps given below to mount the router into the equipment rack.

**Note**

To secure the Cisco ASR 901 10G router to the equipment rack, you must use the two mounting screws (provided) for each side or follow your local practices for installing the router into your equipment rack. Ensure that the rack-mount brackets are securely fastened. For more information, see the [“Attaching Brackets to the Router”](#) section on page 3-3.

**Caution**

To prevent injury, review the [“Safety Guidelines”](#) section on page 2-1 and the [“Rack-Mounting Configuration Guidelines”](#) section on page 3-2 before installing the Cisco ASR 901 10G router in the equipment rack.

-
- Step 1** Locate the equipment rack position where you plan to install the router.
- Step 2** Verify that there are no obstructions and ensure that the equipment rack is stabilized.
- Step 3** Determine whether you are mounting the router on a 19-inch, 23-inch, or an ETSI rack. [Figure 3-1](#) shows the types of mounting brackets.
- Step 4** Determine the mounting position (Front-, Mid-, or Rear-mounting) of the router. (For 19-inch racks, see [Attaching Brackets for 19-Inch Racks](#), page 3-4. For 23-inch racks, see [Attaching Brackets for 23-Inch Racks](#), page 3-5. For ETSI racks, see [Attaching Brackets for ETSI Racks](#), page 3-6.)
- Step 5** Locate the mounting holes of the router.
- Step 6** Align the rack-mounting bracket with the router and position with the four #6-32 x 0.25-inch screws (provided).
- Step 7** Insert the screws (four places) and tighten using a Number 2 Phillips screwdriver (each side).
- Step 8** Position the router in the equipment rack lining up the bracket holes on the router with the holes on the rack and secure with four #6-32 x 0.25-inch mounting screws (two on each side).
- Step 9** Tighten the screws using a 1/4-inch flat-blade screwdriver (each side).
-

Wall-Mounting

- [Attaching Brackets for Wall-Mounting](#), page 3-8
- [Mounting the Router on a Wall](#), page 3-8

**Note**

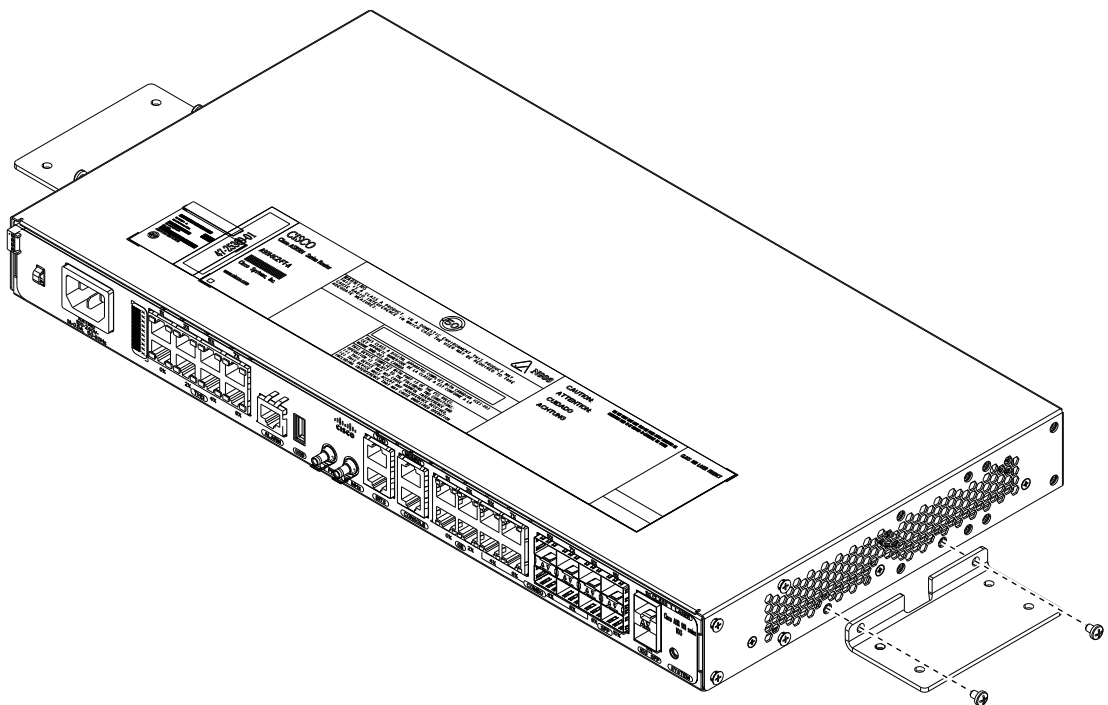
Wall-mounting is not supported for NEBS applications.

Attaching Brackets for Wall-Mounting

Perform the steps given below to attach brackets on the router for wall-mounting.

-
- Step 1** Locate the mounting holes of the router.
 - Step 2** Align the wall-mounting bracket with the router and position with the four Number 6-32 x 0.25-inch screws (provided). See [Figure 3-5](#).
 - Step 3** Insert the screws (in four places) and tighten using a Number 2 Phillips screwdriver (on each side).
 - Step 4** Position the router in the equipment rack lining up the bracket holes on the router with the holes on the rack and secure with four Number 6-32 x 0.25-inch mounting screws (two on each side).
 - Step 5** Tighten the screws using a 1/4-inch flat-blade screwdriver (on each side).
-

Figure 3-5 Attaching 19-inch Bracket to Wall-Mount the Router



1	Phillips truss-head screws	2	
----------	----------------------------	----------	--

Mounting the Router on a Wall

The router can be wall mounted with the ports either facing up or down. The illustration used in the procedure below uses the orientation of ports facing upwards.

For the best support of the router and cables, make sure that the switch is attached securely to wall studs or to a firmly attached plywood mounting backboard.

Perform the steps given below:

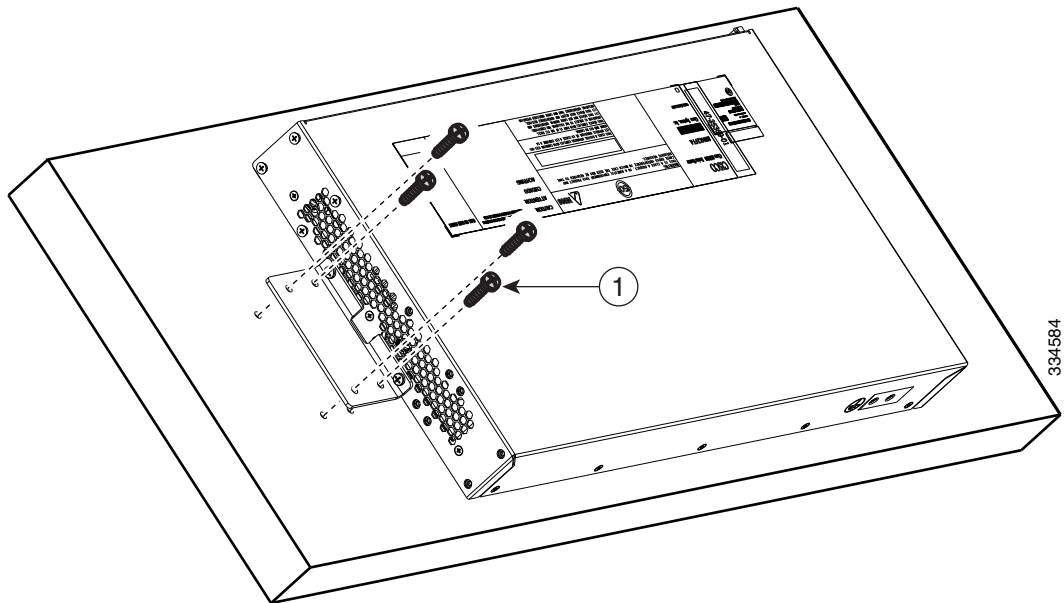


Warning

Read the wall-mounting instructions carefully before beginning installation. Failure to use the correct hardware or to follow the correct procedures could result in a hazardous situation to people and damage to the system. Statement 378

- Step 1** Locate the position where you plan to install the router.
- Step 2** Ensure that there are no obstructions.
- Step 3** Position the router with the ports facing up as in [Figure 3-6](#), or down and align the bracket holes with the holes on the wall and secure with four Number 6-32 x 0.25-inch mounting screws (two on each side).
- Step 4** Tighten the screws using a 1/4-inch flat-blade screwdriver (each side).

Figure 3-6 *Mounting the Router on a Wall*



1	User-supplied screws
----------	----------------------

2	—
----------	---

Connecting the Chassis Ground and Power

Before you connect power or turn on power to the Cisco ASR 901 10G router, you must provide an adequate chassis ground (earth) connection to your router.

Grounding the Cisco ASR 901 10G Router

The Cisco ASR 901 10G router provides a grounding point on the rear of the unit for a 2-hole lug.

To ensure the chassis ground connection that you provide is adequate, you need the following parts and tools:

- Ratcheting torque screwdriver with Phillips head that exerts up to 15 pound-force inches (lbf-in) of pressure for attaching the ground wire to the router.
- Crimping tool as specified by the ground lug manufacturer
- 16-AWG copper wire for the power cord
- Appropriate wire-stripping tools

**Caution**

Before making connections to the Cisco ASR 901 10G router, ensure that you disconnect the power at the circuit breaker. Otherwise it may result in severe injury to yourself, or damage to the router.

**Warning**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

**Warning**

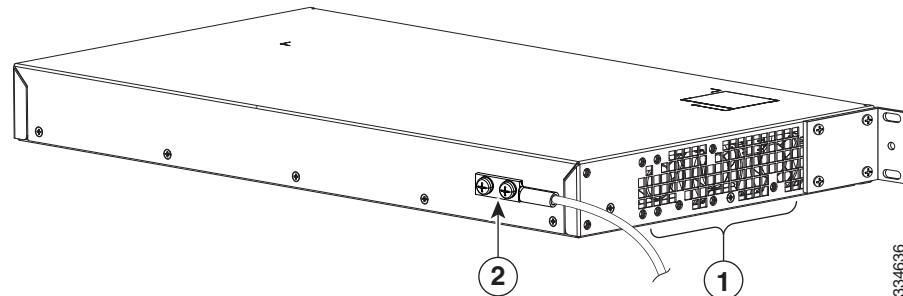
Use copper conductors only. Statement 1025

**Warning**

When installing the unit, the ground connection must always be made first and disconnected last. Statement 42

Figure 3-7 shows the grounding point marked on the rear panel of the Cisco ASR 901 10G router for ease of installation

Figure 3-7 Grounding Point



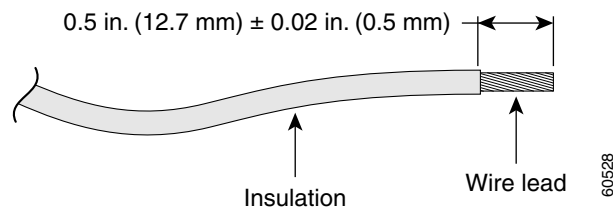
1	Fan	2	Grounding point lug
----------	-----	----------	---------------------

This unit is to be installed in a restrictive access location and must be permanently grounded to minimum 6-AWG copper ground wire.

Perform the steps given below to ground the Cisco ASR 901 10G router using a 2-hole lug and the corresponding mounting point. Most carriers require a 6-AWG ground connection. Verify your carrier's requirements for the ground connection.

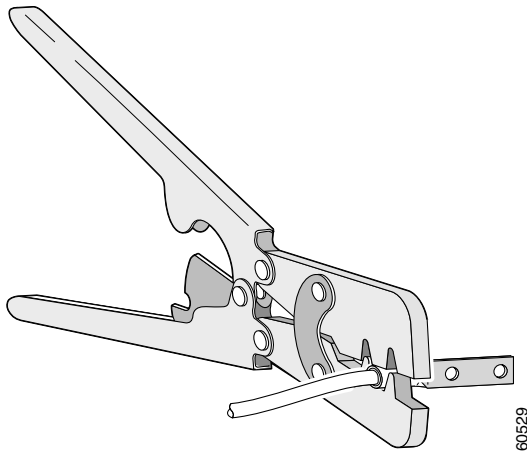
- Step 1** In the accessory kit, locate the 2-hole lug, 2 pan-head Phillips head screws used to attach the lug to the router, and the 6-AWG ground wire. (Lug, screws, and wire are part number 32-0629-01.)
- Step 2** Set the parts aside.
- Step 3** If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch \pm 0.02 inch (12.7 mm \pm 0.5 mm) for the ring terminal (Figure 3-8).

Figure 3-8 Stripping a Ground Wire



- Step 4** Slide the open end of the ground lug over the exposed area of the ground wire.
- Step 5** Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire (Figure 3-9).

Figure 3-9 Crimping a Ground Lug onto the Ground Wire



- Step 6** Use a Phillips head screwdriver to attach the ground lug and wire assembly to the front of the router with the two screws from the accessory kit.
- Step 7** Connect the other end of the ground wire to a suitable grounding point at your site.

Power Connection Compliance



Warning

Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003



Warning

Use copper conductors only. Statement 1025



Note

The installation must comply with the 2002 National Electric Code (NEC) and other applicable codes.

Wiring the DC-Input Power Source



Note

Before connecting the DC-input power source, you should install cable holders in front of the chassis. See [“Installing the DC Power Cord Retainer”](#) section on page 13 on how to install cable holders.



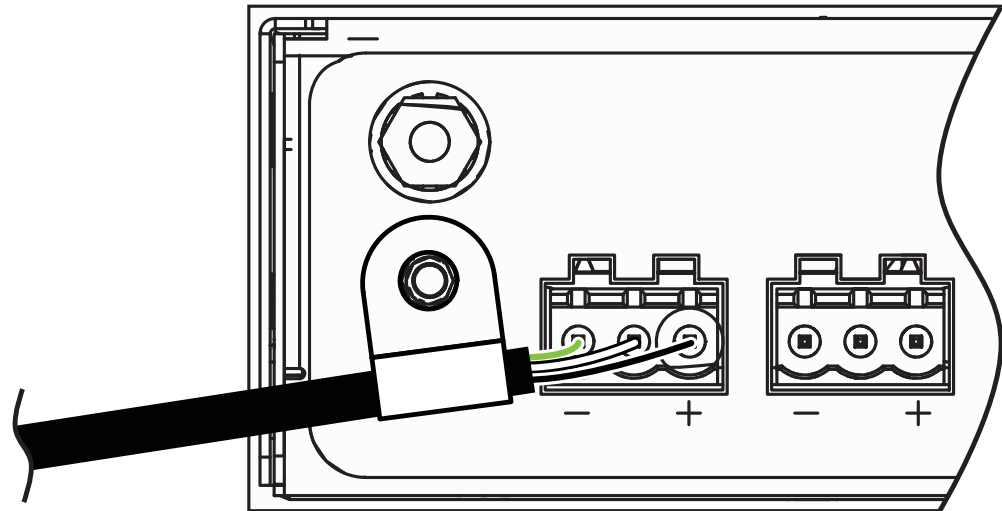
Warning

This product relies on the building’s installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 10 A minimum, 60 VDC. Statement 1005

Complete the following steps to connect the DC power supply to the Cisco ASR 901 10G router:

- Step 1** Switch off the DC power source at the circuit breaker, and place the circuit breaker in the Off position.
- Step 2** Locate the two 3-pin terminal blocks (part number 27-1892-01). The terminal blocks are located in the accessory kit (part number 53-3438-01) shipped with the Cisco ASR 901 10G router.
- Step 3** Plug the 3-pin terminal block into the power connector located on the front side of the router. See [Figure 3-10](#)

Figure 3-10 3-Pin Terminal Block



- Step 4** Repeat Step 3 to attach the other terminal block.
- Step 5** Connect the other end of the power cord to the site DC power source.



Warning

An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the terminal block plug.
Statement 122



Warning

When installing this unit, secure all power cabling to avoid disturbing field-wiring connections.
Statement 38



Caution

DO NOT power on the unit yet.

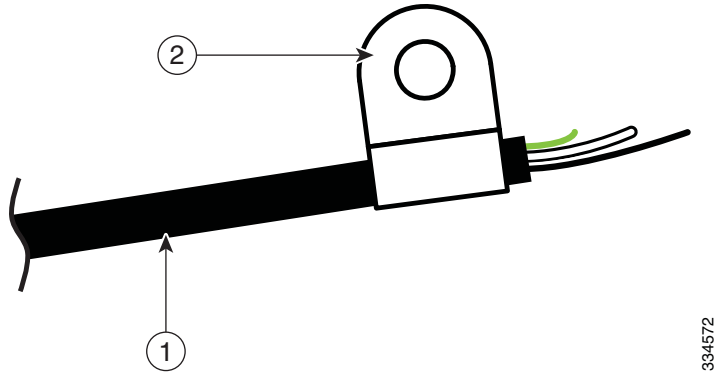
Installing the DC Power Cord Retainer

You must install the two cable holders in front of the chassis before connecting the DC-input power source. The DC-input wire should go through the cable holder before the screw is fastened.

Complete the following steps to install the cable holders to the Cisco ASR 901 10G router.

- Step 1** In the accessory kit, locate the two cable holders and the two pan-head Phillips head screws used to attach the cable holders to the router. (part number of cable holder is 52-0685-01.)
- Step 2** Set the parts aside.
- Step 3** Insert the DC power cord through the cable holder. See [Figure 3-11](#). Repeat this step for the second DC power cord.

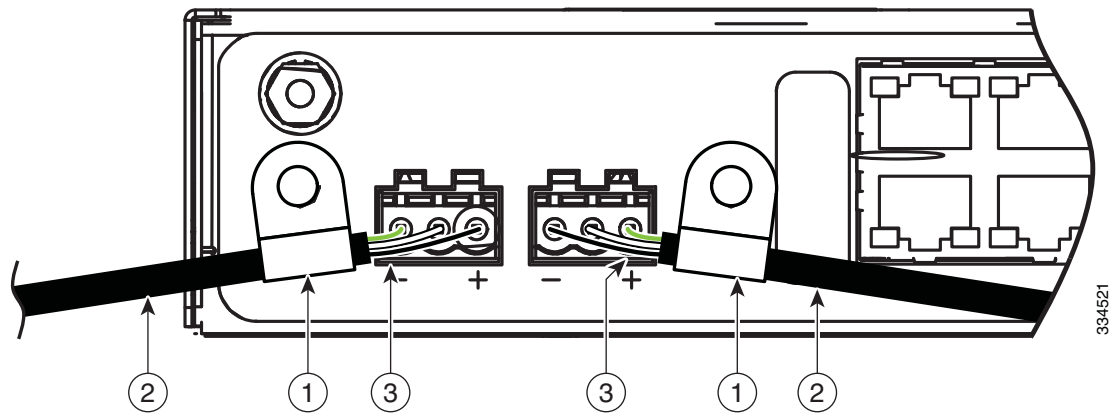
Figure 3-11 Inserting the DC Power Cord Through Cable Holder



1	DC power cord	2	Cable holder
---	---------------	---	--------------

- Step 4** Use a Phillips head screwdriver to attach the cable holders to the front of the router with the two screws from the accessory kit. See [Figure 3-12](#).

Figure 3-12 Attaching Cable Holder to the Router



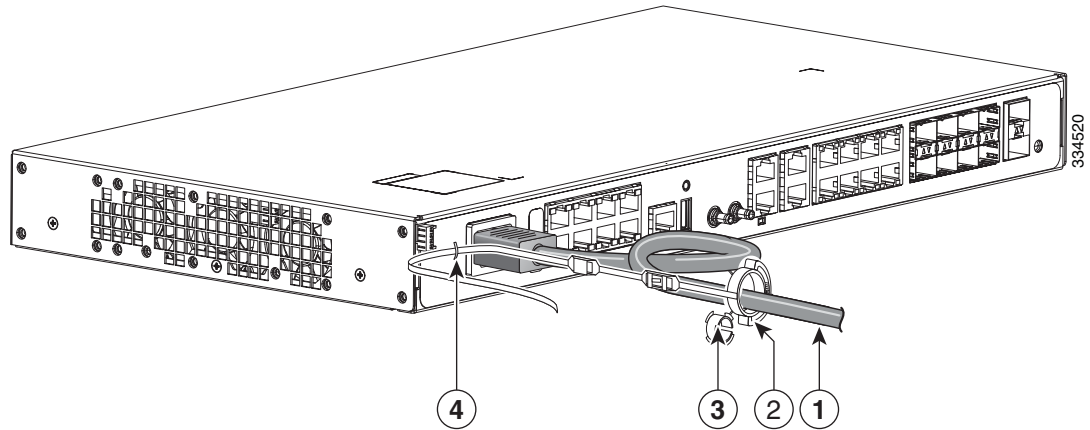
1	Cable holder	2	DC power cord
3	DC terminal	4	—

Installing the AC Power Cord Retainer

Complete the following steps to install the AC power cord retainer to the Cisco ASR 901 10G router using the corresponding mounting point.

- Step 1** Choose the sleeve size of the power cord retainer based on the thickness of the cord. The smaller sleeve can be snapped off and used for thin cords. See [Figure 3-16](#).
- Step 2** Slide the retainer around the AC power cord, and pass it around the lanced loop on the router. See [Figure 3-13](#).

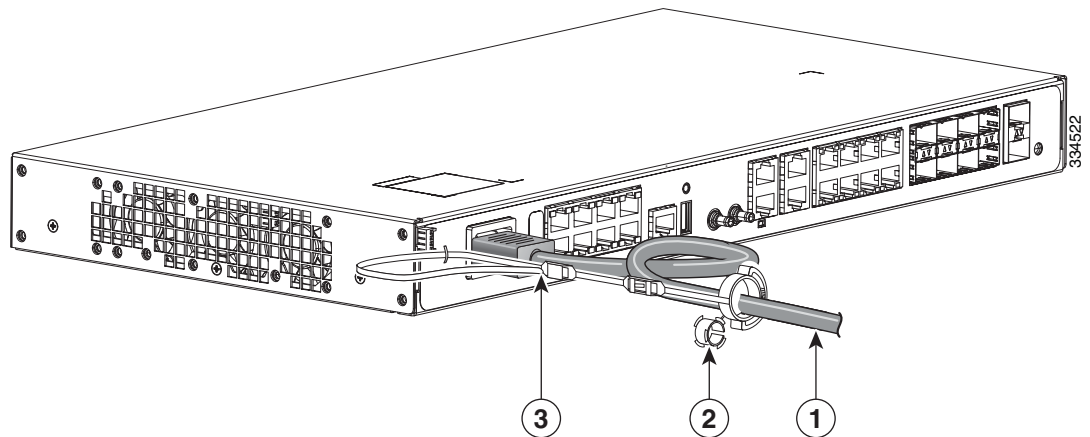
Figure 3-13 Inserting the Retainer through the Lanced Loop



1	AC power cord	2	Power cord retainer
3	Sleeve for thinner power cords	4	Loop

- Step 3** Slide the retainer through the first latch. See [Figure 3-14](#).

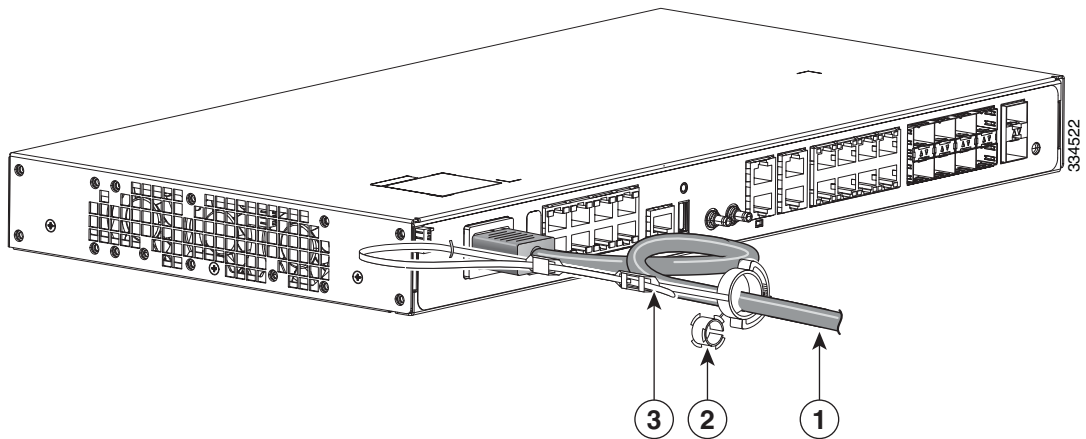
Figure 3-14 Sliding the Retainer Through the Latch



1	AC power cord	2	Smaller sleeve for thin power cords
3	Latch	4	—

Step 4 Slide the retainer through the other latches to lock it. See [Figure 3-15](#).

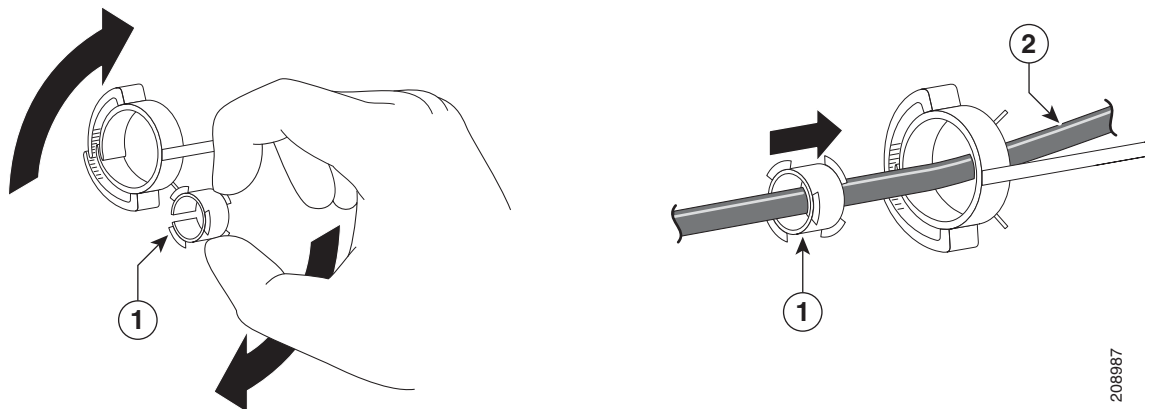
Figure 3-15 Locking the Retainer



1	AC power cord	2	Sleeve for thin power cords
3	Latches		

Step 5 (Optional) Use the small sleeve for thin power cords. Use the small sleeve to provide greater stability for thin cords. Detach the sleeve, and slide it over the power cord. See [Figure 3-16](#).

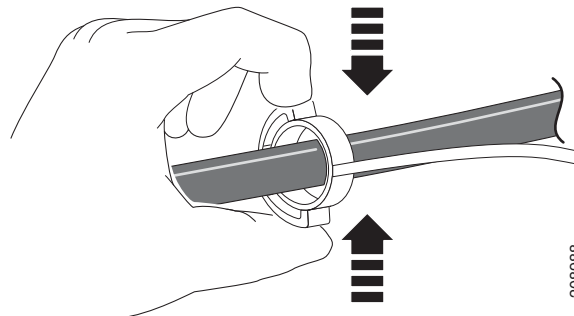
Figure 3-16 Sleeve Around the Power Cord



1	Sleeve for thin power cords	2	AC power cord
---	-----------------------------	---	---------------

Step 6 Secure the AC power cord by pressing the retainer. See [Figure 3-17](#).

Figure 3-17 Securing the Power Cord in the Retainer



Installing and Removing SFP Modules

This section describes how to install and remove SFP modules. The modules are inserted into the SFP module slots on the front of the Cisco ASR 901 10G router. These field-replaceable modules provide interfaces.

For a list of supported SFP modules, see the *Release Notes for Cisco ASR 901 Series Aggregation Services Router*. Each port must match the wavelength specifications on the other end of the cable. For reliable communications, the cable must not exceed 328 feet (100 meters).

For detailed instructions on installing, removing, and cabling the SFP module, see the SFP module documentation.



Note

The installation and removal steps given for SFP modules are also applicable for SFP+ modules.

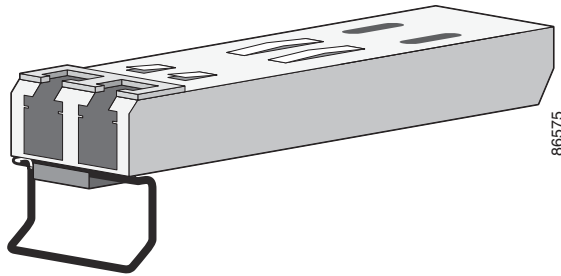
Installing SFP Modules

[Figure 3-18](#) shows an SFP module that has a bale-clasp latch.



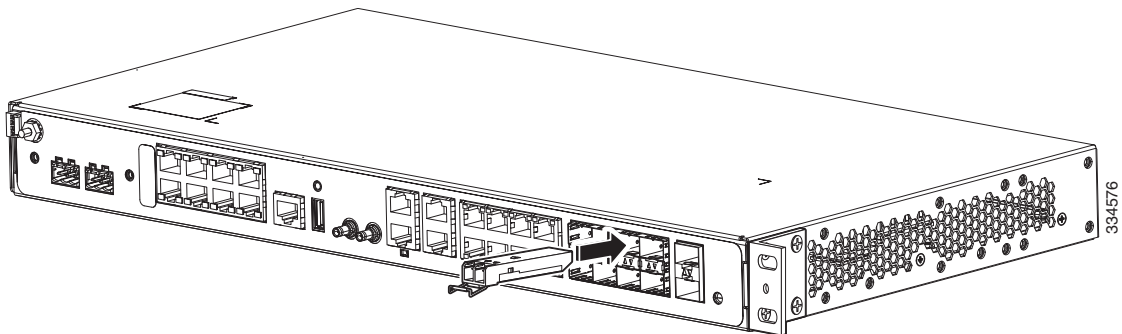
Caution

We recommend that you do not install or remove fiber-optic SFP modules with cables attached because of the potential damage to the cables, the cable connector, or the optical interfaces in the SFP module. Disconnect all cables before removing or installing an SFP module. Removing and installing an SFP module can shorten its useful life. Do not remove and insert SFP modules more often than is absolutely necessary.

Figure 3-18 SFP Module with a Bale-Clasp Latch

Complete the following steps to insert an SFP module into the module slot:

-
- Step 1** Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.
- Some SFP modules identify the top side of the module with transmit (TX) and receive (RX) markings or arrows that show the direction of the connection.
- Step 2** If the SFP module that you are using has the markings, use them to identify the top side of the module.
- Step 3** Align the SFP module in front of the slot opening.
- Step 4** Insert the SFP module into the slot until you feel the connector on the module snap into place in the rear of the slot (see [Figure 3-19](#)).

Figure 3-19 Installing an SFP Module into an SFP Module Slot

- Step 5** For fiber-optic SFP modules, remove the dust plugs from the optical ports, and store them for later use.

**Caution**

Do not remove the dust plugs from the fiber-optic SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light.

- Step 6** Insert the cable connector into the SFP module:
- For fiber-optic SFP modules, insert the line card or MT-RJ cable connector into the SFP module.
 - For copper 1000BASE-T SFP modules, insert the RJ-45 cable connector into the SFP module.
-

Removing SFP Modules

Complete the following steps to remove an SFP module from a module receptacle:

Step 1 Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.

Step 2 Disconnect the cable from the SFP module, and insert a dust plug into the cable end.

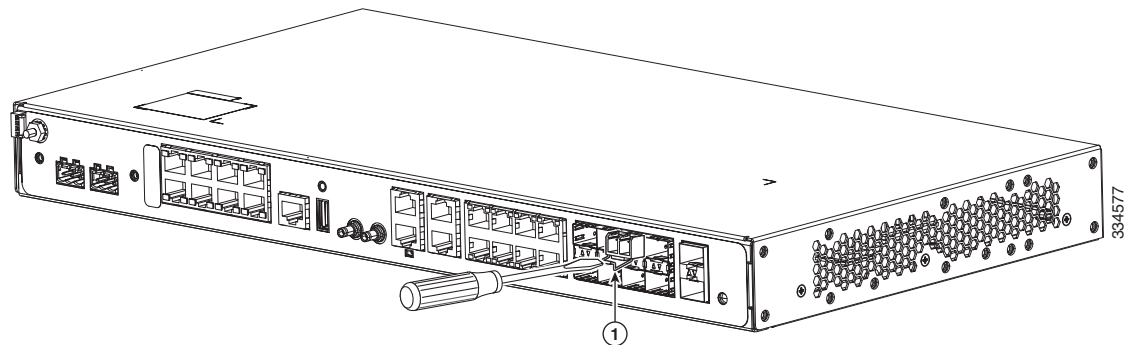


Tip For reattachment, note which cable connector plug is transmit (TX) and which is receive (RX).

Step 3 Unlock and remove the SFP module, as shown in [Figure 3-20](#).

If the module has a bale-clasp latch, pull the bale out and down to eject the module. If the bale-clasp latch is obstructed and you cannot use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bale-clasp latch.

Figure 3-20 Removing a Bale-Clasp Latch SFP Module by Using a Flat-Blade Screwdriver



1	Bale Clasp
----------	------------

2	—
----------	---

Step 4 Grasp the SFP module between your thumb and index finger, and carefully remove it from the module slot.

Step 5 For fiber-optic SFP modules, insert a dust plug into the optical ports of the SFP module to keep the optical interfaces clean.

Step 6 Place the removed SFP module in an antistatic bag or any other protective casing.

Connecting Cables

This section describes how to connect the Cisco ASR 901 10G router to external devices and networks. It includes the following sections:

- [Connecting the Console Port, page 3-20](#)
- [Connecting the Network Cables, page 3-21](#)
- [Dressing Router Cables, page 3-23](#)

Connecting the Console Port



Warning

Do not work on the system or connect or disconnect cables during periods of lightning activity.
Statement 1001

The Cisco ASR 901 10G router has a single console port that can function in DTE mode:

- DTE-mode console (terminal) port for connecting a console terminal



Note

The console port functions are asynchronous serial ports; any devices connected to the console port must be cabled for asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.)

The Cisco ASR 901 10G router uses RJ-45 ports for console port function.

We provide the following cables and adapters for connecting the Cisco ASR 901 10G router to a console terminal:

- One console adapter cable (RJ-45-to-DB-9, blue)

Types of RJ-45 Cables

Cisco products use the following types of RJ-45 cables:

- Straight-through
- Crossover
- Rolled (or Rollover)

The Cisco ASR 901 10G router ships with and uses the rollover cable. For instructions on how to identify a rollover cable, see [Identifying a Rollover Cable, page B-5](#).

Console Port

Complete the following steps to connect a terminal or a PC running terminal emulation software to the console port on the router:

Step 1

Connect the terminal using an RJ-45 rollover cable and an RJ-45-to-DB-25 or RJ-45-to-DB-9 adapter (labeled TERMINAL) to the console port. For cable pinouts, see the [“Console Port Signals and Pinouts” section on page B-4](#).



Note The RJ-45-to-DB-25 adapter (Cisco part number 29-0810-01) can be purchased from Cisco Systems.

Step 2 Configure the terminal or terminal emulation software for 9600 baud, 8 data bits, no parity, and 2 stop bits.



Note Hardware flow control is not possible on the console port.

Connecting the Network Cables

This section describes how to connect the following router interfaces:

- [Connecting Gigabit Ethernet Interface Cables, page 3-21](#)
- [Connecting T1 and E1 Interface Cables, page 3-21](#)
- [Connecting SFP Cables, page 3-22](#)
- [Connecting Cables to the BITS Interface, page 3-22](#)
- [Connecting GPS Cables, page 3-22](#)
- [Connecting GPS Cables, page 3-22](#)
- [Connecting to the Management Ethernet Port, page 3-23](#)

Connecting Gigabit Ethernet Interface Cables

The RJ-45 port supports standard straight-through and crossover Category 5 unshielded twisted-pair (UTP) cables. Cisco Systems does not supply Category 5 UTP cables; these cables are available commercially.

Complete the following steps to connect the cable to the router Gigabit Ethernet port:

-
- Step 1** Ensure the router is powered off.
- Step 2** Connect one end of the cable to the GE port on the router.
- Step 3** Connect the other end to the BTS patch or demarcation panel at your site.
-

For more information about Gigabit Ethernet connectors including pinouts, see [“Gigabit Ethernet Connector Pinouts” section on page B-1](#)

Connecting T1 and E1 Interface Cables

Complete the following steps to connect the cable to a router T1/E1 port:



Note You must close the relays on the card using the standalone subcommand. For more information, see the *Cisco ASR 901 Series Aggregation Services Router Software Configuration Guide*.

-
- Step 1** Ensure the router is powered off.
 - Step 2** Connect one end of the cable to the T1 or E1 (RJ-48C) port. Use a T1/E1 cable.
 - Step 3** Connect the other end to the BTS patch or demarcation panel at your site.
 - Step 4** Turn on power to the router (see [“Powering on the Router”](#) section on page 3-24 for more details).
-

For more information about T1/E1 connectors including pinouts, see [“T1/E1 Port Pinouts”](#) section on page B-2.

Connecting SFP Cables

Complete these steps to connect the cable to a router SFP port.

-
- Step 1** Ensure the router is powered off.
 - Step 2** Insert the SFP module patch cable into the slot until you feel the connector on the cable snap into place in the rear of the slot.
 - Step 3** Connect the other end to the patch or demarcation panel at your site.
 - Step 4** Turn on power to the router (see [“Powering on the Router”](#) section on page 3-24 for more details).
-

For more information about SFP connectors, see [“SFP and SFP+ Port Pinouts and Cable Specifications”](#) section on page B-2.

Connecting Cables to the BITS Interface

Complete these steps to connect the cable to the router BITS port:

-
- Step 1** Ensure the router is powered off.
 - Step 2** Connect one end of the cable to the BITS port using a T1/E1 cable.
 - Step 3** Connect the other end to the SETS unit.
 - Step 4** Turn on power to the router (see [“Powering on the Router”](#) section on page 3-24 for more details).
-

For more information about T1/E1 connectors including pinouts, see [“BITS Port Pinouts”](#) section on page B-6.

Connecting GPS Cables

The following sections describe how to connect cables from the Cisco ASR 901 10G router to a GPS unit for input or output timing or frequency.

- [Connecting Cables to the 10Mhz or 1PPS Interface](#)
- [Connecting Cables to the ToD Interface](#)

Connecting Cables to the 10Mhz or 1PPS Interface

Complete these steps to connect cables to the 10Mhz or 1PPS interface:

-
- Step 1** Ensure the router is powered off.
 - Step 2** Connect one end of a mini-coax cable to the GPS unit.
 - Step 3** Connect the other end of the mini-coax cable to the 10Mhz or 1PPS port on the Cisco ASR 901 10G router.

For instructions on how to configure clocking, see the *Cisco ASR 901 Series Aggregation Services Router Software Configuration Guide*.

For more information about 10Mhz and 1PPS port pinouts, see [“GPS Port Pinouts” section on page B-7](#).

Connecting Cables to the ToD Interface

Complete these steps to connect cables to the ToD interface for GPS timing.

-
- Step 1** Ensure the router is powered off.
 - Step 2** Connect one end of a straight-through Ethernet cable to the GPS unit.
 - Step 3** Connect the other end of the cable to the ToD port on the Cisco ASR 901 10G router.

For instructions on how to configure clocking, see the *Cisco ASR 901 Series Aggregation Services Router Software Configuration Guide*.

**Note**

For more information about BITS port pinouts, see [“Time of Day Pinouts” section on page B-6](#).

Connecting to Alarm Port

Use a straight cable to connect to the alarm port. For details on the pinouts, see [“Alarm Port Pinouts” section on page B-8](#).

Connecting to the Management Ethernet Port

Use a straight or a cross over ethernet cable to connect to the management ethernet port. For details on the pinouts, see [“Management Ethernet Port Pinouts” section on page B-9](#).

Dressing Router Cables

Ensure all Cisco router cables are properly insulated so as not to interfere with each other or other pieces of equipment. Use local practices to ensure that the cables attached to your router are properly insulated.

**Note**

If your Cisco ASR 901 10G router is front-mounted, you can use the cable guide (found in the accessory kit) to dress the cables.

To continue the installation, proceed to the next section, “[Powering on the Router](#).”

Powering on the Router

**Warning**

Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected. Statement 4

**Warning**

This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use. Statement 39

Checklist for Power on

Complete these steps to power on the Cisco ASR 901 10G router:

- Securely mount the router.
- Properly connect the power, network, and interface cables.

Interpreting Front-Panel LEDs

The Cisco ASR 901 10G router provides a number of LEDs on the front panel to monitor conditions and to aid in troubleshooting problems. For a description of the LEDs, see the “[Reading the LEDs](#)” section on page A-4.

Power-On Procedure

Complete these steps to power on the Cisco ASR 901 10G router and verify its initialization and self-test:

-
- Step 1** Remove the tape from the circuit breaker switch handle.
- Step 2** Restore power by moving the handle of the circuit breaker to the ON position.
- The LED (labeled POWER) on the front panel should go ON and the fans should begin to operate. Depending on your installation, other front-panel LEDs can also come on.

**Note**

When the Cisco ASR 901 10G router (DC unit) is powered ON, it takes about 30 seconds for the system LED to turn ON.



Note

If you encounter problems when you power on the router, see [Appendix A, “Troubleshooting”](#).

Formatting Procedures for Flash Memory

We recommend that you erase the (Class B) flash memory to initialize with a Class B flash file system. The Class B flash file system is also known as the low end file system (LEFS).

Formatting Flash Memory as a DOS File System

To format the flash memory, or to remove the files from it, use the **erase flash:** command.

The following is sample output for formatting the flash memory, formatted with a Class B flash file system:

```

Router# erase flash:
Erasing the flash filesystem will remove all files! Continue? [confirm]
Erasing device

.....
.....
.....
.....
.....
.....
.....
...erased
Erase of flash: complete

```

File and Directory Procedures

The following sections describe file and directory procedures for flash memory, formatted with a Class B flash file system.

Copying Files

To copy files to another location, use the **copy tftp:flash:** command.

The following is sample output for copying the file from an external location to the internal flash memory.

```

Router# copy tftp: flash:
Address or name of remote host []? 10.64.71.240
Source filename []? /ngmwr-advipservicesk9-mz
Destination filename [ngmwr-advipservicesk9-mz]?
Accessing tftp://10.64.71.240/ngmwr-advipservicesk9-mz...
Erase flash: before copying? [confirm]n
Loading /ngmwr-advipservicesk9-mz from 10.64.71.240 (via FastEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 30480936 bytes]

```

```
Verifying checksum... OK (0xA6AD)
30480936 bytes copied in 196.968 secs (154751 bytes/sec)
```

Displaying Contents of the Flash Memory

To display the contents (directories and files) of the flash memory formatted with a Class B flash file system, use the **dir:** command.

The following is sample output for displaying the contents of the flash memory with a Class B flash file system:

```
Router# dir
Directory of flash:/

 1 -rw- 30564420 <no date> ngmwr-advipservicesk9-mz
 2 -rw- 30564420 <no date> ngmwr-backup

83623932 bytes total (22494964 bytes free)
```

Deleting Files from the Flash Memory

To delete a file from the flash memory, use the **delete: filename** command followed by the **squeeze flash:** command.

When a file is deleted in the Class B flash file system, the memory space occupied by the deleted file is not released until you use the squeeze command. Although the memory space once occupied by the deleted file remains, the deleted file cannot be recovered. To release the memory space occupied by a deleted file, enter the **squeeze flash:** command

The following is sample output for deleting a Cisco IOS file from the flash memory, and releasing the memory space originally occupied by the file.

```
Router# dir
Directory of flash:/
 1 -rw- 30564420 <no date> ngmwr-advipservicesk9-mz
 2 -rw- 30564420 <no date> ngmwr-backup
83623932 bytes total (22494964 bytes free)

Router# delete ngmwr-advipservicesk9-mz
Delete filename [ngmwr-advipservicesk9-mz]?
Delete flash:ngmwr-advipservicesk9-mz? [confirm]

Router# show flash:
les_flash_info : 1006 :

System flash directory:
File Length Name/status
 1 30564420 ngmwr-advipservicesk9-mz [deleted]
 2 30564420 ngmwr-backup
[61128968 bytes used, 22494964 available, 83623932 total]
81920K bytes of processor board System flash (Read/Write)

Router# squeeze flash:
Squeeze operation may take a while. Continue? [confirm]
squeeze in progress...
```


- Verifying that you are in the flash:/ directory

```
Router# cd flash:
```

```
Router# pwd
```

```
flash:/
```

What to Do After Installing the Hardware

After you install the router hardware, refer to the *Cisco ASR 901 Series Aggregation Services Router Software Configuration Guide* for the software configuration information.



Troubleshooting

If you encounter problems while the router is in operation, use the information in this appendix to help isolate problems or to eliminate the router as the source of the problem.

This appendix contains the following sections:

- [Problem Solving, page A-1](#)
- [Reading the LEDs, page A-4](#)

If you cannot locate the source of the problem, contact a customer service representative for information on how to proceed. For technical support information, see the *Cisco Information Packet* publication that shipped with your router. Before you call, have the following information ready:

- Chassis type and serial number
- Maintenance agreement or warranty information
- Type of software and version number
- Date you received the new chassis
- Brief description of the problem
- Brief explanation of the steps you took to isolate the problem



Note Ensure you provide the customer service representative with any upgrade or maintenance information that was performed on the router after your initial installation (see [Appendix C, “Site Log”](#) for Site Log information.)

Problem Solving

To solve a problem, isolate the problem to a specific subsystem by comparing the current router activity to the expected router activity.

The LEDs on the front panel of the router enable you to determine router performance and operation. For a description of these LEDs, see [“Reading the LEDs” section on page A-4](#).

When solving a problem, check the following router subsystems:

- Power and cooling systems—External power source, power cable, router power supply and circuit breaker, and router fans. Also check for inadequate ventilation or air circulation.
- Modules—Checking the LEDs on the modules can help you to identify a failure.
- Cables—Ensure that the external cables connecting the router to the network are all secure.

Troubleshooting the Power and Cooling Systems

See [Table A-1](#) for information to help you isolate the problem.

Table A-1 *Troubleshooting the Power and Cooling Systems*

Symptom	Possible Cause	Corrective Action
The power (labeled PWR) LED on the front panel is not on.	The power source is not connected properly. Note When the Cisco ASR 901 10G router (DC unit) is powered ON, it takes about 30 seconds for the system LED to turn ON.	Check the DC or AC input. Check the DC or AC source.
The router shuts down after being on for only a short time.	The cause is environmental.	Check for an environmentally induced shutdown. (See “Environmental Reporting Features” section on page A-2).
	The fans do not work; the router overheats and shuts down.	Check the fans.
	The chassis intake and exhaust vents are obstructed.	Check the chassis intake and exhaust vents for obstructions. Clear any obstructions.
	Installation does not meet environmental site requirements.	Check the environmental site requirements in the “System Specifications” on page -9.
The router partially boots, but the LEDs do not come on.	There is a possible power supply failure.	Check the power LED on the front panel of the router. If the LED is on, the power supply is functional. If the LED is off, refer to the <i>Cisco Information Packet</i> for warranty information or contact customer service.

Environmental Reporting Features

The router has a temperature sensor to detect over temperature conditions inside the chassis. The over temperature detection triggers an alert at 70°C. This condition is reported to the processor as an interrupt, where software takes action to generate the appropriate alarms. If the router reaches a temperature of 85°C, the power supply will cycle to prevent the router from exceeding that temperature while being powered up state. See [Table A-2](#) for help in interpreting environmental reporting features.

Table A-2 Interpreting Environmental Reporting Features

Symptom	Possible Cause	Corrective Action
<p>The router operates at an abnormally high temperature. The following message appears on the console screen:</p> <pre>%SYS-1-OVERTEMP: System detected OVERTEMPERATURE condition. Please resolve cooling problem immediately!</pre>	<p>There is a fan failure.</p> <p>There is an air conditioner failure in the room.</p> <p>The air flow to cooling vents is blocked.</p>	<p>Take corrective steps. For information about environmental operating conditions, see the System Specifications, page 1-9).</p>

Troubleshooting Cables and Connections

Network problems can be caused by a cable or cable connection, or external device such as a modem, transceiver, hub, wall jack, WAN interface, or terminal. See [Table A-3](#) for information to help you isolate the problem.

Table A-3 Troubleshooting Cables, and Connections

Symptom	Possible Cause	Corrective Action
The router is experiencing network problems.	<p>The router does not boot properly.</p> <p>The router constantly or intermittently reboots.</p>	<p>Check the router chassis or software. For warranty information, refer to the <i>Cisco Information Packet</i> publication that shipped with your router or contact customer service.</p>
	The router boots, but the console screen is frozen.	<p>Verify that the parameters for your terminal are set as follows:</p> <ul style="list-style-type: none"> (a) The terminal should have the same data rate as the router (9600 bps is the default). (b) 8 data bits. (c) No parity generated or checked. (d) 2 stop bits.
	The router powers on and boots only when a particular cable is disconnected.	<p>There may be a problem with the module or cable. For warranty information, refer to the <i>Cisco Information Packet</i> publication that shipped with your order or contact customer service.</p>

Reading the LEDs

The following sections describe the LEDs on the router.

- [Chassis LEDs](#)
- [T1/E1 Interface LEDs](#)

Chassis LEDs

Table A-4 summarizes the LEDs on the chassis of the router. These LEDs are common to all versions of the router.

Table A-4 LED Summary

LED	Color/State	Location	Description
Copper GE Ports (from GE/FE Quad PHY) Contain Two LEDs each			
RJ-45 Link	Solid Green	PHY	Link with no activity
<i>L</i>	FLASH Green		Link with activity
	Off		No link
RJ-45 Speed	Green	PHY	Speed 1000
<i>S</i>	Off		off
T1/E1 ports contain Two LEDs each			
Alarm	Off	WP2	Not configured
<i>AL</i>	Yellow		Alarm Condition
Active	Off	WP2	Out of Service / Not configured
<i>C</i>	Green		Carrier Condition (all-ok)
Copper GE (from Quad combo PHY) ports contain Two LEDs each			
RJ-45 Link	Solid Green	PHY	Link with no activity
<i>L</i>	FLASH Green		Link with activity
	Off		No link
RJ-45 Speed	Green	PHY	Speed 1000
<i>S</i>	Off		off
System LED			
System	Off	HP	No power or unit not boot-up
	Alternating Green/Off		POST in progress
	Solid Green		System Healthy (normal operation)
	Solid Red		System Faulty
SFP LED			
SFP Link-Active	Orange	HP	Link and Active Indicator
<i>L-A</i>	Off		Not Enabled

Table A-4 LED Summary

10G SFP+ LED			
SFP Link-Active	Orange	HP	Link and Active Indicator
L-A	Off		Not Enabled

T1/E1 Interface LEDs

Table A-5 summarizes the LEDs on the T1/E1 interface (available only for A901-12C-FT-D, A901-4C-FT-D, A901-6CZ-FT-D, and A901-6CZ-FT-A).

Table A-5 T1/E1 Port LEDs

LED	Color/State	Description (two LEDs for each T1/E1 port)
Active (labeled C, left LED)	Green	Carrier condition—operating without problem
	Yellow	Loop condition
	Off	Out of service or not configured
Alarm (labeled AL, right LED)	Yellow	Alarm condition
	Off	No alarm

SFP Ethernet Interface LEDs

Table A-6 gives information about the LEDs on the SFP interface.

Table A-6 SFP LEDs

LED	Color/State	Description
SFP Link/Active (labeled LINK ACT)	Orange	Link and active indicator
	Off	Link not enabled

10G SFP+ Ethernet Interface LEDs

Table A-6 gives information about the LEDs on the 10G SFP+ interface.

Table A-7 10G SFP+ LEDs

LED	Color/State	Description
SFP+ Link/Active (labeled 10GSFP)	Orange	Link and active indicator
	Off	Link not enabled

RJ-45 Ethernet Interface LEDs

Table A-8 summarizes the LEDs on the RJ-45 Ethernet interface.

Table A-8 100/1000 Ethernet Port LEDs

LED	Color/State	Description (two LEDs for each 100/1000 Ethernet port)
100/1000 RJ-45 link (labeled L, left LED)	Solid Green	Link with no activity
	Flash Green	Link with activity
	Off	No link detected
100/1000 RJ-45 speed (labeled S, right LED)	Green	Speed 1000
	Yellow	Speed 100
	Off	Off



Cable Specifications

If you prefer to build your own cables, this appendix provides cable specifications for the Cisco ASR 901 10G router.

The appendix includes the following sections:

- [Gigabit Ethernet Connector Pinouts, page B-1](#)
- [SFP and SFP+ Port Pinouts and Cable Specifications, page B-2](#)
- [T1/E1 Port Pinouts, page B-2](#)
- [Console Port Signals and Pinouts, page B-3](#)
- [BITS Port Pinouts, page B-6](#)
- [Time of Day Pinouts, page B-6](#)
- [GPS Port Pinouts, page B-7](#)
- [Alarm Port Pinouts, page B-8](#)
- [Management Ethernet Port Pinouts, page B-9](#)
- [Auxiliary Port, page B-9](#)



Warning

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, use only shielded cables that are grounded on both ends for Type 2 and Type 4 ports that require shielded cables.

Gigabit Ethernet Connector Pinouts

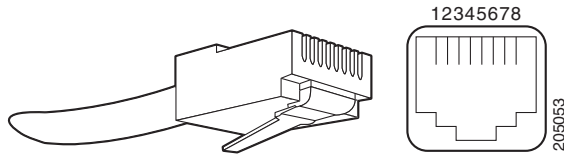
This section illustrates the Gigabit Ethernet RJ-45 connector and lists its pinout and signal descriptions.



Note

The RJ-45 ports are capable of operating in both 100BaseT and 1000BaseT modes.

[Figure B-1](#) shows the RJ-45 connector and port, and [Table B-1](#) lists the connector pinouts and signals.

Figure B-1 RJ-45 Connector and Port**Table B-1 RJ-45 Connector Pinouts**

Pin	FE Signal	GE Signal
1	TX data+	TX A+
2	TX data-	TX A-
3	RX data+	RX B+
4	Not used	TX C+
5	Not used	TX C-
6	RX data-	RX B-
7	Not used	RX D+
8	Not used	RX D-

SFP and SFP+ Port Pinouts and Cable Specifications

For information about SFP and SFP+ modules supported by the Cisco ASR 901 10G router, including pinouts, see the [Connector and Cable Specifications](#) document on Cisco.com.


Note

Pins not listed in the tables in this appendix are not connected.

T1/E1 Port Pinouts

[Figure B-2](#) shows the RJ-48C connector used by the T1/E1 ports on the TDM interface module on the Cisco ASR 901 10G router.

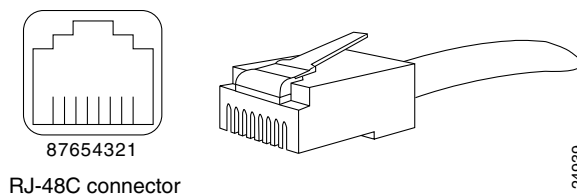
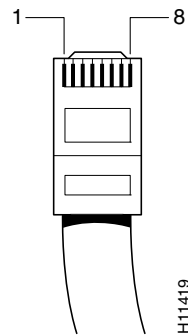
Figure B-2 RJ-48C Connector

Figure B-3 shows the RJ-48C connector wiring for the T1/E1 cable.

Figure B-3 RJ-48-to-RJ-48 T1/E1 Cable Wiring



Note

We recommend using a shielded cable for RJ-48C connectors.

Table B-2 shows the pinout configuration for the RJ-48C connectors on the Cisco ASR 901 10G router for both the shielded and unsaddled cables for either T1 or E1. Table B-2 shows the pinout configuration for the RJ-45 connectors on the TDM interface module on the Cisco ASR 901 10G router.

Table B-2 T1/E1 Port Pinout for the Cisco ASR 901 10G router

Pin	Signal Name	Direction	Description
1	RX Tip	Input	Receive Tip
2	RX Ring	Input	Receive Ring
3	—	—	Not used
4	TX Tip	Output	Transmit Tip
5	TX Ring	Output	Transmit Ring
6	—	—	Not used
7	—	—	Not used
8	—	—	Not used

Console Port Signals and Pinouts

The Cisco ASR 901 10G router ships with a console cable kit, which contains the cable and adapters to connect a console terminal (an ASCII terminal or PC running terminal emulation software). The console cable kit includes the following items:

- RJ-45-to-RJ-45 rollover cable
- RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL)

To connect a modem, you need to order an auxiliary cable.

For console connections, see the “[Console Port Signals and Pinouts](#)” section on page B-4.

Console Port Signals and Pinouts

Use the thin, flat, RJ-45-to-RJ-45 rollover cable and the RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL) to connect the console port to a PC running terminal emulation software. Figure B-4 shows how to connect the console port to a PC. Table B-4 lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL).

Figure B-4 Connecting the Console Port to a PC

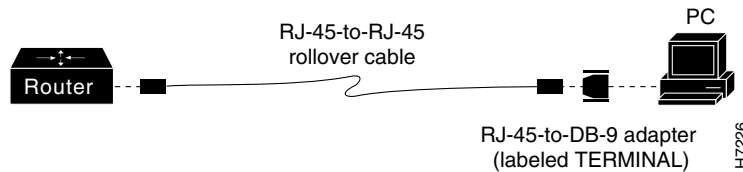


Table B-3 lists the Console port pinouts for the Cisco ASR 901 10G router.

Table B-3 Console Port Pinouts

Pin	Signal Name	HP Pins	Direction	Description
1	RTS	UART_RTS1	Output	Request to send
2	DTR	NC		
3	TXD	UART_SOUT1	Output	Transmit data
4	RI	GND		Ring indicator
5	GND	GND		
6	RXD	UART_SIN1	Input	Receive data
7	DSR/DCD	NC	Input	Data set ready/Data Carrier detect
8	CTS	UART_CTS1	Input	Clear to send

Table B-4 describes the pinouts RJ-45-to-RJ-45 and RJ-45-to-DB-9 rollover cables.

Table B-4 Console Port Signaling and Cabling Using a DB-9 Adapter

Console Port (DTE)	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-9 Terminal Adapter (Connected to Rollover Cable)	Console Device	
	Signal	RJ-45 Pin	RJ-45 Pin		DB-9 Pin
RTS		1 ¹	8	8	CTS
DTR		2	7	6	DSR/DCD
TxD		3	6	2	RxD
GND/RI		4	5	5	GND
GND		5	4	5	GND/RI
RxD		6	3	3	TxD

Table B-4 Console Port Signaling and Cabling Using a DB-9 Adapter

Console Port (DTE)	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-9 Terminal Adapter (Connected to Rollover Cable)	Console Device
	RJ-45 Pin	RJ-45 Pin	DB-9 Pin	
Signal				Signal
DSR/DCD	7	2	4	DTR
CTS	8 ¹	1	7	RTS

1. Pin 1 is connected internally to pin 8.

Table B-5 lists the pinouts for the asynchronous serial console port, the RJ-45-to-RJ-45 rollover cable, and the RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL).

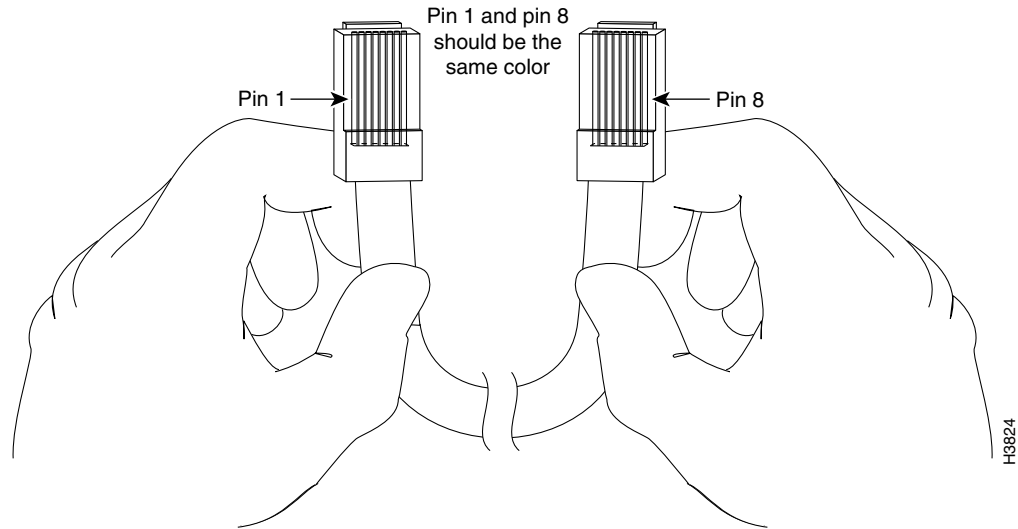
Table B-5 Console Port Signaling and Cabling Using a DB-25 Adapter

Console Port (DTE)	RJ-45-to-RJ-45 Rollover Cable		RJ-45-to-DB-25 Terminal Adapter	Console Device
	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	
Signal				Signal
RTS	1 ¹	8	5	CTS
DTR	2	7	6	DSR/DCD
TxD	3	6	3	RxD
GND/RI	4	5	7	GND
GND	5	4	7	GND/RI
RxD	6	3	2	TxD
DSR/DCD	7	2	20	DTR
CTS	8 ²	1	4	RTS

1. Pin 1 is connected internally to pin 8.

Identifying a Rollover Cable

To identify a rollover cable, compare the modular plugs at the two ends of the cable. When you hold the plugs side by side, with the tab at the back, the wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug (Figure B-5.) If you purchased your cable from Cisco Systems, pin 1 is white on one connector, and pin 8 is white on the other (a rollover cable connects pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5).

Figure B-5 Identifying a Rollover Cable

BITS Port Pinouts

Table B-6 list the pinouts for the BITS interface RJ-45 port on the Cisco ASR 901 10G router.

Table B-6 BITS Pinouts for the Cisco ASR 901 10G router

Pin	Signal Name	Direction	Description
1	RX ring	Input	Receive ring
2	RX tip	Input	Receive tip (T1/E1)
3	Not connected		
4	TX ring	Output	Transmit ring
5	TX tip	Output/input	Transmit tip (T1/E1)
6			Not connected
7			Not connected
8			Not connected

Time of Day Pinouts

Table B-6 list the pinouts for the Time of Day RJ-45 interface on the Cisco ASR 901 10G router.

Table B-7 Time of Day RJ-45 Interface Pinout

Pin	Signal Name	Direction	Description
1			Not connected
2			Not connected

Table B-7 Time of Day RJ-45 Interface Pinout

Pin	Signal Name	Direction	Description
3			Not connected
4	Ground		
5	Ground		
6			Not connected
7	TOD_N	Output/Input	Time of Day RS422 differential input or output
8	TOD_P	Output/Input	Time of Day RS422 differential input or output

GPS Port Pinouts

The Cisco ASR 901 10G router has a 10Mhz and a 1PPS GPS port that allow you to configure input or output clocking with a GPS device. [Table B-8](#) summarizes the pinouts for the 10Mhz and 1PPS interfaces.


Note

For pinouts related to ToD and 1PPS using the BITS interface, see [Console Port Signals and Pinouts](#).

Table B-8 GPS Port Pinouts for the Cisco ASR 901 10G router

	10 Mhz	1PPS
Waveform	Input—Sine wave Output—Square wave	Input—Pulse shape Output—Pulse shape
Amplitude	Input— > 1.7 volt p-p (+8 to +10 dBm) Output— > 2.4 volts TTL compatible	Input— > 2.4 volts TTL compatible Output— > 2.4 volts TTL compatible
Impedance	50 ohms	50 ohms
Pulse Width	50% duty cycle	26 microseconds
Rise Time	Input—AC coupled Output—5 nanoseconds	40 nanoseconds

The 1PPS interface type is Series 1.0 / 2.3, 50 ohms.

For instructions on how to configure the 10 Mhz and 1PPSs ports, see the *Cisco ASR 901 Series Aggregation Services Router Software Configuration Guide*.

Alarm Port Pinouts

The router has four alarm inputs. The alarm setting is open or closed.

- Open means that the normal condition has current flowing through the contact (referred to as *normally closed* contact). The alarm is generated when the current stops.
- Closed means that no current flows through the contact (referred to as *normally open* contact). The alarm is generated when the current flows.

The alarm input is a dry-contact alarm port. You can connect up to four alarm inputs from devices, such as a door, a temperature gauge, or a fire alarm, to the alarm port. You can use the **alarm-contact** command to set the alarm severity to minor, major, or critical. An alarm generates a system message.



Note

External DC bias is not required for the alarm port inputs.

Figure B-6 shows the RJ-45 connector pinouts used for alarm, and Table B-9 lists the connector pinouts and signals.

Figure B-6 RJ-45 Connector Pinouts for Alarm

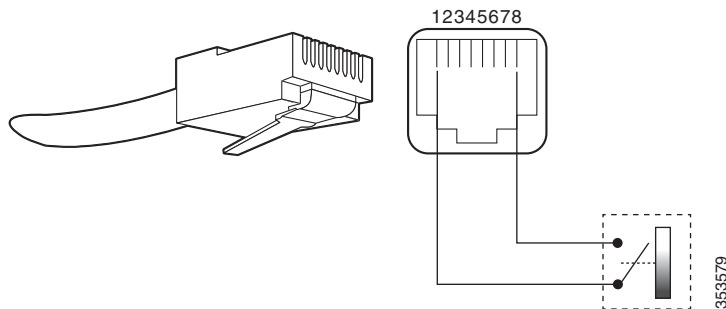


Table B-9 lists the pinouts for the alarm port (RJ45) on the Cisco ASR 901 10G router.

Table B-9 Alarm Port Pinout

Pin	Signal Name	Description
1	Alarm input 1	
2	Alarm input 2	
3		Not connected
4	Alarm input 3	
5	Alarm input 4	
6		Not connected
7		Not connected
8	Alarm input return	

Management Ethernet Port Pinouts

Table B-10 list the pinouts for the management ethernet port (RJ-45) on the Cisco ASR 901 10G router.

Table B-10 Management Ethernet Pinout

Pin	Signal Name	Description
1	RxD_P	
2	RxD_N	
3	TxD_P	
4		Not connected
5		Not connected
6	TxD_N	
7		Not connected
8		Not connected

Auxiliary Port

Auxiliary port is not supported on the Cisco ASR 901 10G router and you should not try to configure the auxiliary port.



Site Log

Use the site log to provide a record of actions related to installing and maintaining the router. Keep it in an accessible place near the chassis so that users performing tasks have access to it. Use the installation checklist (see the [“Installation Checklist” section on page 2-7](#)) to verify the steps in the installation and maintenance of your router. Site Log entries might include the following:

- Installation progress—Make a copy of the Cisco ASR 901 10G installation checklist, and insert it into the site log. Make entries as you complete each task.
- Upgrade, removal, and maintenance procedures—Use the site log as a record of ongoing router maintenance and expansion history. Each time a task is performed on the Cisco ASR 901 10G router, update the site log with the following information:
 - Removal or replacement of interface modules
 - Configuration changes
 - Maintenance schedules and requirements
 - Maintenance procedures performed
 - Intermittent problems
 - Comments and notes

[Table C-1 on page C-2](#) shows a sample site log. Make copies of the sample or design your own site log to meet the needs of your site and equipment.



Numerics

10Mhz Interface, Connecting cables to [3-23](#)

1PPS Interface, Connecting cables to [3-23](#)

A

adapter pinouts [B-4, B-5](#)

audience [1-viii](#)

B

back panel [3-13](#)

before you begin

 unpacking and checking

 shipment [2-6](#)

BITS Interface, Connecting cables to [3-23](#)

BITS Pinouts [B-6](#)

C

cable

 assemblies [B-3](#)

checklist, installation [2-7](#)

Cisco Information Packet publication [2-6](#)

connecting

 gigabit ethernet interface cables [3-21](#)

 network cables [3-21](#)

 power supply [3-10](#)

console port

 adapter [B-5](#)

 connections [2-8, 3-20](#)

 considerations [2-8](#)

pinouts [B-5](#)

console port signaling cabling, DB-25 (table) [B-5](#)

console port signaling cabling, DB-9 (table) [B-4](#)

console port signals and pinouts [B-4](#)

conventions, documentation [1-viii](#)

D

documentation

 conventions [1-viii](#)

E

equipment

 for installation [2-6](#)

 racks rack-mounting

 equipment [2-5](#)

exposed wires (warning) [3-13](#)

F

Front View [1-2, 1-3](#)

G

general site requirements [2-4](#)

gigabit ethernet

 connecting interface cables [3-21](#)

GPS Cables, Connecting cables to [3-22](#)

GPS Interfaces, connecting cables to [3-23](#)

GPS Port Pinouts [B-7](#)

grounding

 (warning) [3-24](#)

H

hardware

- installing [3-1](#)
- troubleshooting procedures [A-1](#)

I

installation

- checklist [2-7](#)
- hardware [3-1](#)
- mounting [3-2](#)
- tools required [2-6](#)

installing SFP modules [3-17 to 3-18](#)

interface

- numbering [1-7](#)

Interface Numbering [1-7](#)

L

LEDs

- front panel [A-3](#)

log

- site [C-1](#)

M

method of procedures

- See MOP

MOP [2-5](#)

mounting

- instructions [3-2](#)

Nnetwork cables, connecting [3-21](#)

numbering

- interface [1-7](#)

PPinouts, GPS Port [B-7](#)power (warning) [2-2](#)powering on [3-24](#)power lines (warning) [2-2](#)power supplies (warning) [2-2](#)

power supply

- connecting [3-10](#)

power supply (warning) [3-12, 3-24](#)

problem solving

- See* troubleshooting

Rrecord keeping, site log [2-8](#)regulatory compliance [1-9](#)removing SFP modules [3-19 to ??](#)restricted access (warning) [2-2, 3-1](#)rollover cable, identifying [B-6](#)

S

safety

- information [1-9](#)

- overview [1-ix](#)

secure cabling (warning) [3-13](#)SELV circuits (warning) [1-5, 2-2](#)

SFP modules

- bale-clasp latch removal [3-19](#)

- installation [3-17 to 3-18](#)

SFP Modules and Cable Specifications [B-2](#)

shipment

- unpacking and checking [2-6](#)

site

- configuration [2-4](#)

- environment [2-4](#)

- log [C-1](#)

site log, record keeping [2-8](#)

site requirements

 MOPs [2-5](#)

specifications

 system [1-7](#)

specifications, system [1-7](#)

system specifications [1-7](#)

T

temperature sensor [1-7](#)

Time of Day Interface, Connecting cables to [3-23](#)

tools required for installation [2-6](#)

troubleshooting

 cables [A-3](#)

 connections [A-3](#)

 cooling system [A-2](#)

 front panel LEDs [A-3](#)

 modules [A-3](#)

 power system [A-2](#)

V

ventilation [2-5](#)

W

warning

 short circuit [3-12](#)

warnings

 safety overview [1-ix](#)

